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Iron Deposits of Nova Scotia

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Preface

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This report provides information on the ores of iron, their distribution and the environment in which they occur in Nova Scotia. Information written herein is based on results of geological studies and chemical investigations compiled by the author from field work carried out in recent years. Also included as part of this report is an extensive study of literature which embodies the investigations of many individuals and government agencies since the major discovery of iron was reported about the year 1820.

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Halifax, Nova Scotia
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Chapter I

Introduction

General Statement and Purpose of Report

Mining and smelting of iron ore began in the Province of Nova Scotia on a small scale in 1825 to continued intermittently until 1913. The early operations were locally important, but had limited capacity because they were dependent on small quantities of iron ore and on the use of charcoal for fuel. The greatest production of iron ore in Nova Scotia was between 1853 to 1874 when fairly substantial bodies of limonite, ankerite, hematite and siderite were mined and smelted at Londonderry, Colchester County. Many small deposits of iron ore capable of producing a few thousand tons were discovered at various locations throughout Nova Scotia and some production was recorded. With the discovery of the large iron deposits at Wabana, Newfoundland, in 1892, and in the Lake Superior region in 1877, attention was directed from the smaller deposits in Nova Scotia.

A considerable amount of geological work has been done from time to time in the iron-bearing districts, much of it by geologists of the Geological Survey of Canada and by company geologists. Much of the information, however, is found in scattered reports and papers which are readily accessible to the general public.

The aim of this report is to assemble from the literature and recent field studies information on the iron deposits of Nova Scotia. Adequate accounts of certain iron occurrences were already available and such occurrences were visited only to study the surficial geology and to inspect the iron mineralization. Most of the development work was done on the iron deposits over eighty years ago, so that the growth of underbrush combined with the caving of trenches and open-cuts has made many of the iron occurrences difficult to locate and impossible of access.

The present investigation was undertaken in furtherance of the Department of Mines' program for a systematic study and evaluation of the mineral resources of Nova Scotia. Field investigations were commenced in 1959 to continued with interruptions due to other commitments until October 1962. Chemical analyses were made of the iron mineralization from several localities to determine the type and amounts of impurities. Microscopic study was made to determine mineralogical composition and physical characteristics of the iron minerals and gangue. Diamond drilling was carried out at three locations for evaluation purposes.

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History of Iron Mining in Nova Scotia

The earliest reference to iron ore in Nova Scotia was in 1604, when DeMonts reported finding veins of magnetite in the basaltic flows in Digby County and layers of magnetite in the sand deposits along the beaches of St. Marys Bay. It does not, however appear that any attention was paid by the early settlers to the deposits. It was not until early in 1800 that any attempt was made to use the iron ore.

The first Catalan forge was built around 1825 at Nictaux Falls, Annapolis County, in which a few tons of bar iron were made. In 1825, a blast furnace was built at Clementsport, Annapolis County, by the Annapolis Iron Company, Limited, to smelt the magnetic iron ores obtained from Nictaux Falls and from three small deposits near Clementsport known as the Milner, Potter and Milbury. Approximately 350,000 tons of ore were produced from this area during sporadic workings of the mines between 1825 to 1913.

The iron deposits along the bank of the East River of Pictou County, near Bridgeville, were discovered in 1828. In 1829, the General Mining Association of London, England, collected limonite boulders and mined some of the red hematite and smelted it in a small furnace at the Albion Mines, Pictou County. Some of the iron ore smelted was fossiliferous hematite and is said to have produced iron which on account of the phosphorus was exceedingly hard. Records indicate that 188,000 tons of iron ore were produced from the ten showings.

Iron deposits in the Londonderry area of Colchester County were developed in 1849 by Acadia Iron Company using six Catalan forges and a puddling furnace. This famous area was one of the early scenes of mining activity in Canada and one of the first areas where iron and steel were produced in quantity. Some of the first experiments on a commercial scale using Dr. Siemens direct process of making steel from molten iron were carried out in 1874-75 at Acadia Mines. This process with further development became known as the open-hearth converter, and is one of the principal methods used for making steel.

A charcoal blast furnace was operated intermittently between 1852 to 1875 at Londonderry, Colchester County, and the first steel plant was erected in 1870. This plant was demolished in 1877 when the site was used for rolling mills. Since 1908 no mining or smelting has been done in the district.

In 1856, two small blast furnaces were built at Nictaux, Annapolis County, to smelt the fossiliferous hematite discovered along the Nictaux River. They did not remain in production very long and the iron produced is said to have been of poor quality; no doubt on account of the phosphorus.

In 1882, the Nova Scotia Forge Company installed an open-hearth steel making furnace in Ferrona, Pictou County, and changed its name to the Nova Scotia Steel and Forge Company. A blast furnace was built in 1890 by this Company at Ferrona to smelt ore from Pictou County. In 1892 the Nova Scotia Steel and Coal Company purchased large reserves of iron ore from Bell Island, Conception Bay, Newfoundland. These deposits have been operated almost continuously from 1895 to about 1966 to supplied about 50 per cent of the iron ore requirements for the Sydney Steel mill. A large amount of the Wabana iron ore was exported to Europe. To ensure an adequate supply of coal an extensive deposit was obtained near Sydney on the coast of Cape Breton Island in 1893. In 1928 Dominion Steel and Coal Corporation (Dosco) incorporated and acquired the assets of the British Empire Steel Corporation.

A considerable tonnage of iron ore grading from 30 to 54 per cent metallic iron was mined between 1890 to 1913 from the "Leckie" and "Shell" beds of fossiliferous hematite, in the Nictaux-Torbrook area, Annapolis County, and mixed with the Londonderry carbonate-type of iron ore. The two ores supplement each other, the Torbrook ore being high in phosphorus and sulphur, the Londonderry ore being slightly lower in iron but low in sulphur and phosphorus and often nearly self-fluxing by reason of its content of lime and magnesium carbonates.

A small production of iron ore is recorded from various other points in Nova Scotia. From Brookfield, Colchester County, around 44,000 tons of limonite were shipped to Londonderry and Ferrona for smelting. A small production of iron ore is recorded from Erinville, and from other localities in Guysborough County. In Antigonish County, oolitic hematite was mined at Doctors Brook and at other points. In Cape Breton iron ore is found in widely separated areas and some of the deposits have been mined in the past. A small tonnage of excellent grade magnetite ore was mined from a small deposit on Economy Mountain, Colchester County, and at several points in the basaltic rocks along the southern side of the Bay of Fundy.

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Definition of Iron Ore

In this report the term iron ore is used in a general geologic sense for masses in which iron ore minerals are abundant; the occurrence may not be of economic value. Iron can, for example, be extracted from titaniferous iron ores by using special smelting processes where titanium oxide is also recovered, but large-scale production of iron from this material has not been economical. The final criterion for an ore is whether its use will enable a company to operate at a profit. Strictly speaking none of the iron-rich deposits in Nova Scotia can be said to constitute iron ore in the strict sense of the term. However, for convenience throughout this report, all of the iron-rich occurrences shall be referred to as iron ore bodies. No single term seems appropriate to describe the great number of noncommercial occurrences of iron ore that occur in Nova Scotia.

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Acknowledgements

Special thanks are due to Dr. George Aletan formerly Professor of Metallurgical Engineering at the Nova Scotia Technical College of Halifax who accompanied the writer during the field season of 1959. His microscopic study of the various iron ores added greatly to the knowledge of the mineral associations and physical characteristics of the ores. The writer acknowledges the important contribution made to this work by personnel of the Cartographic Division, especially in the preparation of several figures and for many constructive suggestions.

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Chapter II

Data on Iron Ores

The main purpose of this report is the presentation of data on the iron deposits of Nova Scotia. Data on iron ores in general will assist in any assessment of the economic value of any particular deposit described in the following chapter. There are only a few industrially important minerals of iron, although several hundred minerals contain iron. In most iron ore deposits, magnetite, hematite, siderite, limonite are the major iron minerals. Marketable iron ores are derived from oxides, carbonate or sulphide deposits.

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Sources of Metallic Iron

Magnetite

Composition Fe_3O_4 iron content 72.4 per cent); color is iron-black, ore is strongly magnetic; specific gravity is 5.17-5.18. It has octahedral parting due to twinning, which is often well developed. Magnetite occurs often as veins and stringers in igneous rocks; disseminated in rocks to form bodies of low-grade ore; as replacement in sedimentary and metamorphic rocks and as banded layers in metamorphic and igneous rocks. Magnetite has never been known to occur pure in masses of more than a few tons, or of very high grade in deposits yielding more than a few thousand tons.

Hematite

Composition Fe_2O_3, (iron content 70 per cent). It is by far the most important iron mineral in the iron deposits of Nova Scotia. Hematite has a metallic to earthly lustre, and the color is steel grey to black, reddish black and red.

Varieties are specular iron which occurs in very brilliant plates or crystals; red ochre, an earthly, more or less impure material; and martite, pseudomorphs after magnetite.

Hematite occurs mainly in bedded deposits in sedimentary rocks and is usually associated with other iron minerals. The iron content of the hematite deposits in Nova Scotia varies from 42 per cent to nearly 66 per cent in a deposit at Barachois, Cape Breton Island.

Limonite (Goethite)

Composition ($2Fe_2O_3$, $3H_2O$) (iron content 62 per cent). Essentially a superficial weathering product of hematite and carbonate ($FeCO_3$). Goethite (Fe_2O_3, H_2O) is very similar in composition to limonite, but is distinguished from it by being crystalline. Limonite takes a great variety of forms, colors and degrees of hardness and compactness; botryoidal, stalactitic, massive or specular in forms and many shades of yellow and brown to almost black in color. The iron content of the limonite mined from the various deposits in Nova Scotia is approximately 45 per cent.

Siderite

Composition $FeCO_3$ (iron content 48.2 per cent). Color may be brown or grey, rarely greenish, reddish, yellowish or black. It tarnishes reddish brown to brownish black. Siderite veins occur in Pictou County and in the Londonderry iron deposit in association with ankerite.

Ankerite

Composition Ca, Fe, $Mg(CO_{32}$. Ankerite is usually mixed mechanically with siderite, hematite and limonite. The largest bodies of ankerite are in the Londonderry area, Colchester County and average less than 10 per cent metallic iron. Since ankerite contains iron, lime and magnesia, it is useful as a flux and at the same time contributes to the iron content of the furnace charge.

Chamosite

Chamosite is a hydrated ferrous aluminum silicate, greenish in color. It occurs associated with hematite in narrow beds at Piedmont, Pictou County, and to a lesser extent in the iron ores in the Torbrook-Nictaux area. In most occurrences chamosite occurs as concentric layers surrounding a nucleus composed of quartz, a shell fragment or a small area of hematite. The iron (Fe) content of chamosite is approximately 16 per cent.

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Impurities in Iron Ore

The value of an iron ore is not entirely determined by the iron content. While the iron content of an ore is important, it is not necessarily the most critical impurities. The chemical constituents of minerals associated with iron-ore minerals are commonly designated as oxides - silica, alumina, lime and magnesia; or as elements - sulphur, phosphorus, manganese, titanium, chromium and nickel. Some of these constituents, which in general are referred to as impurities are harmful, whereas others are beneficial. The main impurities in iron ores and their action in the furnace are described below:

Silica

Silica acts as an acid in the blast furnace and must be fluxed with a base, such as lime or magnesia. High silica ores are uneconomical to use in ordinary blast furnaces by reason of the high fuel consumption caused by the excessive amount of slag obtained. Such ores require large quantities of lime to neutralize the silica. Such low iron-high silica ores should therefore by beneficiated prior to smelting or sweetened in smelting with high grade ore or scrap iron.

Steel plants prefer an iron ore running 6 to 8 per cent silica, but ores are accepted that carry up to about 12 per cent silica. There is no premium paid for iron ore containing low silica. About 2 pounds of limestone ($CaCO_3$) is needed to flux each pound of silica. Of course, a low silica ore is more valuable than one with high silica, as normally the iron content will be higher and the producer is not required to pay shipping charges on valueless silica.

Phosphorus

Phosphorus present in the iron ores cannot be removed in the slag and nearly all goes into the pig iron on smelting and must be removed when it is converted into steel. Steel with a high phosphorus content tends to be brittle and cracks on rolling. High phosphorus pig iron is used in limited amounts in making complicated castings where high fluidity is needed and great strength is not necessary. The amount of phosphorus in the pig iron then ultimately determines the process to be used in the manufacture of steel. The figures given below show the limits of allowable phosphorus in pig iron for the various steel manufacturing processes:

- Acid open-hearth - less than 0.05 per cent
- Acid Bessemer - less than 0.1 per cent
- Basic open-hearth - not over 1.5 per cent
- Basic Bessemer - at least 1.5 per cent and preferably over 2 per cent
- Foundry iron - wide range according to the ultimate use intended for the product

Sulphur

Sulphur, which is usually derived from sulphide bearing minerals, is undesirable and high sulphur ores are penalized. No premium is normally paid for low-sulphur ores, but the percentage should not exceed 0.1 per cent. A small percentage of sulphur in a blast furnace charge is eliminated with the gas, but the rest is divided between the slag and the pig iron.

The sulphur content of the iron ores of Nova Scotia varies between .010 per cent and 6.18 per cent. It is more abundant in the specular hematite deposits, than in magnetite and bedded hematite. Very little sulphur occurs in the limonite deposits of Nova Scotia.

Titanium

Titanium is frequently found associated with magnetite ores and is particularly undesirable. Iron ores with 0.1 per cent titanium are difficult to market. It is not possible economically to separate the titanium by milling because of the ultimate association and intergrowth of the minerals in the ore. Titanium is objected to by users or iron ores because it is said to make a pasty slag and may eventually choke the furnace.

The iron ores of Nova Scotia contain very little titanium. It is present in some of the magnetite from the Triassic basalt and occasionally associated with the magnetic hematites in the Torbrook area. Titanium was not determined in many of the analyses available.

Manganese

Some manganese is usually associated with iron ores, especially in the hematite and limonite types. Manganese bearing iron ore is desirable in the basic open-hearth process for deoxidation and sulphur removal. If the manganese content of the iron ore is sufficiently high, spiegel iron with 10 to 30 per cent manganese can be produced in the blast furnace. The allowable manganese content of pig iron for the manufacture of steel varies between 0.5 per cent and 2.5 per cent. It is very difficult to alter the percentage of manganese in the crude ore by beneficiation as the properties of the iron and manganese minerals are similar. Manganese content above 2 per cent is generally paid for at the same rate as is paid per unit of iron content.

The limonite and hematite, especially along the Windsor-Horton contact averages 4 per cent manganese and at one point 24.7 per cent. The Triassic magnetite and the Torbrook magnetite and hematite have very little manganese and that does not occur persistently.

Alumina

Some alumina, occurring chiefly as kaolinite, is present in many iron ores. If it occurs in excess of 5 per cent, there may be some difficulty in finding a market and a penalty is imposed. As the alumina content increases, the iron content decreases and the ore becomes waste material.

Alumina is rarely present in the Nova Scotia iron occurrences in such quantities as to be harmful, except where the iron minerals are mixed with argillaceous country rock. All of the analyses available from various iron occurrences in Nova Scotia indicate an alumina content of less than 5 per cent.

Lime and Magnesia

Calcium and magnesium occur in iron ores as carbonates and silicates. They are considered desirable impurities in ore to neutralize the silica and form slag. If appreciable quantities of lime and magnesia are present, a higher silica content can be used. About 2 pounds of lime are necessary in the blast furnace to flux one pound of silica and more coke is required when ores of high silica and low iron content are used.

Arsenic

Arsenic is reduced in the furnace and practically all of it remains in the metal. It is objectionable in steels used for canning foods because of its poisonous aspect.

Other Minor Elements

The occurrence in an iron ore of cooper, zinc and nickel is undesirable as these elements accumulate in the hot metal and effect iron and steel making processes. The combined amounts of copper, lead, zinc, arsenic, chromium, vanadium and nickel should not exceed 0.05 per cent.

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Physical Properties of Iron Ore

In addition to the mineralogical and chemical composition of the iron ore, it is necessary to mention the following physical properties:

Moisture

The moisture content varies from around 1 per cent for hard dense hematite and magnetite to more than 20 per cent for soft limonite ores. The moisture content in an ore should not exceed 10 per cent.

Density

It is necessary to know the density of the ore in order to establish tonnage estimates. The variation in the porosity of the iron ore accounts largely for the difference in density. Lean, cherty, waste rocks with less than 40 per cent iron in some cases, have a higher density than ore containing 60 per cent iron.

Hardness and Structure

Magnetite ores are usually hard while carbonate ores vary from relatively hard to soft. Hematite and limonite ores range from hard, dense varieties to soft and earthy types. The structure of an iron ore refers to the proportion of fine and coarse fragments. If the iron ore contains more than 15 per cent fines, it is not acceptable by the steel plants.

Loss on Ignition

In the chemical analyses of iron ores, volatile material such as carbon dioxide and chemically combined water are reported as "loss on ignition". If the iron ore carries a considerable amount of carbonates and hydrated iron oxides, the loss on ignition may be considerable, thus reducing the iron content.

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Classification of Iron Ores

For commercial purposes, iron ore is classified according to chemical composition and physical character. If the material as mined meets market specifications for composition (51.50 to 65 per cent iron) it is classed as direct-shipping ore; that is, it requires no treatment before smelting. Material of direct-shipping quality usually contains up to 12 per cent silica and 0.045 per cent phosphorus, about 1.5 per cent alumina, variable amounts of manganese and small amounts of calcium and magnesium.

The greater part of the iron ore smelted requires concentration of the iron and removal of undesirable constituents before they can be utilized. In some cases a simple washing process is used to remove the fines, which are the lean parts of the ore, in order to up-grade it to direct-shipping specifications.

By-product iron ores are those that are derived from the mining and treatment of an ore from which some other valuable constituent is also recovered. Iron in the form of pyrite, pyrrhotite and magnetite is a major constituent in many sulphide deposits mined for nickel, copper, base metals and gold. Considerable iron is being recovered from the sulphide deposits at Noranda, Quebec, in the Sudbury area, Ontario, and from pyrrhotite tailings at Kimberley, British Columbia.

Further classification as to chemical composition is also necessary. Ores with a phosphorus content not exceeding .045 per cent are known as Bessemer ores, and if the content is over .045 per cent but not greater than .180 per cent the term non-Bessemer ore is used. If the phosphorus exceeds that amount the ore is classified as high-phosphorus ore.

It is difficult to draw a line between direct-shipping ores and those of lower classification because practically all ores are now upgraded or beneficiated in some way before shipping. As structure is a very important aspect of iron ore, the size of the ore pieces must be neither too large nor too small to be treated efficiently in the blast furnace.

The physical character of iron ore is the basis for a two-fold classification. Lump or hard ore is very compact and coherent material and is especially desirable for use in open-hearth furnaces. Soft ore is porous, granular and earthly, only moderately coherent and breaks down easily when handled. A high percentage of the ore passes the quarter-inch diameter screen and only a small amount can be used directly in the furnace without choking gas circulation.

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Types of Iron Ore Deposits in Nova Scotia

The iron ore deposits of Nova Scotia have been formed by a variety of geologic processes and combinations of processes, but three general types of deposits are most important. These are bedded, replacement veins and residual deposits. Minor amounts of bog iron ores occur at several locations in Nova Scotia.

Bedded iron deposits are sedimentary layers that accumulated by precipitation of iron compounds in bodies of water. The deposition was in bogs, lakes or seas, and the iron deposits are associated with the normal sequence of strata formed in these environments. Bedded iron deposits are generally very extensive, but only a part of the material is ore. The hematite bearing bedded deposits in Nova Scotia are marine sedimentary rocks which, except for weathering along the outcrop, have remained practically unaltered since deposition. The ore beds are commonly interbedded shelf type sediments and with dark green to black shale, sandstone and argillite. This type of iron formation is most extensively developed in lower Palaeozoic rocks and consists of beds of red hematite-chamosite oolites, formed around fossil fragments or clastic debris.

Iron deposits of the replacement and vein type are massive or tabular bodies of iron ore minerals that have taken the place of pre-existing rock forming minerals or have filled voids in the rock, especially openings along fractures. Constituents forming the iron ore minerals were presumably derived from magmatic sources in the hydrothermal variety of replacement and vein deposits and from products of rock weathering transported by ground water in the surficial variety. The shape, size and distribution of the replacement type are controlled mainly by structural features, and only a few are large enough to be of economic importance. Iron minerals, probably of replacement origin, are disseminated along shear zones or fracture and joint systems.

Residual iron deposits have formed by decomposition of a variety of rocks whose original iron content has been increased by removal of nonferrous constituents. The deposits are limonite, hematite and goethite that were originally in the rock or were formed from iron-bearing carbonates or silicates. The best example of residual deposits are in the Londonderry area of Colchester County. The ore consist of limonite (goethite) and hematite and occurs in ferruginous carbonate rocks (ankerite) containing 10 to 12 per cent iron. The residual iron accumulated in lenses and pockets as a result of weathering processes.

Most bog iron deposits are small and of minor importance. Included in this group is precipitated iron usually goethite (limonite) but occasionally some siderite. Organic debris and carbonaceous material may be replaced by ferric oxide compounds and in some bogs by siderite. Manganese oxides may be present and all gradations can occur from bog iron to bog manganese deposits. Bog iron deposits may indicate other types of iron occurrences in an area, such as carbonate beds or sulphide deposits.

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Evaluation of Iron Ores

Many factors have to be considered before exploiting on iron deposit with the idea of establishing an iron ore industry. The chief factors are:

a. ore grade;
b. amenability to concentration;
c. location with respect to transportation and

d. the size of the deposit.

Preferred ore used now contains 60 to 66 per cent iron, less than 6 per cent silica, less than one per cent lime, magnesia or alumina, and is very low in phosphorus and sulphur. The importance of using high grade ore in blast furnace operations make it profitable to concentrate ores containing as much as 60 per cent iron.

In order to determine if the iron ore is amenable to concentration and treatment, many tests are necessary. A mineralogical description of the ore and a geological description of the deposit is essential. Without knowing the type of mineral intergrowth and the grain size, texture and mineralogy of the ore proper procedures cannot be selected. Coarse-grained ores are easier to concentrate than fine-grained ores provided the elements present are in separate grains. If the ore can be separated from the gangue without fine-grinding, concentration of the iron can be achieved by several methods. Ores composed of mixtures of iron oxides, quartz, and iron silicate or carbonate minerals are difficult to concentrate. It may be impossible to liberate their mineral components even with very fine-grinding.

In recent years steel mills have been built in populated areas where the steel is sold and used. More efficient transportation and the handling of the raw material make it less expensive to move the coal, limestone and ore to areas of steel consumption than to transport the steel products to markets. The iron deposits close to steel plants may not be able to supply ore requirements and the quality may be unsuitable for modern steel making processes. To satisfy the markets for high grade iron ore, deposits are being worked in distant areas.

For economic operation, large deposits of uniform composition must be available. To be of economic importance at least 20,000,000 tons with 50 per cent iron content, if not direct-shipping ore, must be in sight.

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Iron Ore Production in Nova Scotia from 1886-1913

1886 - 44,338 tons
1887 - 43,532 tons
1888 - 42,611 tons
1889 - 54,161 tons
1890 - 49,206 tons
1891 - 53,649 tons
1892 - 78,258 tons
1893 - 102,201 tons
1894 - 89,379 tons
1895 - 83,792 tons
1896 - 58,810 tons
1897 - 23,400 tons
1898 - 19,079 tons
1899 - 28,000 tons

1900 - 18,940 tons
1901 - 18,619 tons
1902 - 16,172 tons
1903 - 40,335 tons
1904 - 61,293 tons
1905 - 84,952 tons
1906 - 97,820 tons
1907 - 89,839 tons
1908 - 11,802 tons
1910 - 18,134 tons
1911 - 22 tons
1912 - 30,857 tons
1913 - 20,436 tons

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Chapter III

Description of Principal Iron Occurrences

Colchester County

The principal iron occurrences in Colchester County are located in the Brookfield, Clifton and Londonderry areas. Small deposits of limonite, red hematite, specu hematite and magnetite occur in the vicinity of Upper Kemptown and at several localities along the Cobequid Mountains.

Brookfield Area

There are two deposits in this area known as the "Chambers" and "Pearson" mines. They are located about 3 miles east of Brookfield and 7 miles south of Truro, Colchester County. The deposits were first worked in 1889 by Mr. R. E. Chambers of New Glasgow, the ore being sold to the predecessors of the Londonderry Iron and Mining Company. Subsequently the property was sold to the New Glasgow Iron, Coal and Railway Company.

The rocks exposed in this area are Carboniferous in age. They are a sedimentary succession of red shale and grey sandstone of the Horton Group and limestone, gypsum, red shale and barite of the marine Windsor Group. The Horton-Windsor rocks occupy a synclinal structure with a gentle plunge to the east. Along the northern flank of the syncline, Horton and Windsor rocks are in disconformable contact; the southern contact is a fault zone.

A major fault trending north 70 degrees east, with a steep dip to the south is visible in the barite quarry. Diamond drilling to extend the barite deposit northeast of the quarry indicated several northeasterly trending faults with steep dips. The two lenticular masses of limonite occur along one of the faults. (Fig. 1)

Figure: (Not presently available)
Figure 1. Plan showing iron deposits and regional geology, Brookfield area, Colchester County, Nova Scotia

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Chambers Mine (1)[1]

Lat: 45° 16' 18"
Long: 63° 14' 00"
Ref. Map: 11nbsp;E 6 East Half

([1]Numbers refer to locations of deposits on map in pocket.)

At the time of the examination, 1959, the shafts and trenches were caved or flooded and the dumps are largely grown over. A good exposure of shale was observed along the northwest wall of the open-cut near the Pearson shaft. The information given in this report is largely compiled from work of previous writers who were able to examine the underground workings.

The iron mineralization at the Chambers mine was massive to botryoidal, limonite and red hematite localized along a fault cutting shale of the Horton Group. The longer direction of the iron horizon was at a very oblique angle to the stratification both in strike and dip. The extent of the iron deposit was approximately 300 feet long, 40 to 80 feet wide and was investigated to a depth of 200 feet.

Production records indicate that 44,000 tons of iron ore were produced from the Chambers Mine, the pocket of ore being nearly exhausted. The early production was shipped to the smelter at Londonderry. Subsequently the property was sold to the New Glasgow Iron, Coal and Railway Company and the iron ore smelted in the furnace at Ferrona, Pictou County.

Many analyses are available of the iron ore from the Chambers Mine. All are from carload lots and many are averages of several cars. The analyses show a moderate iron content, high in silica, manganese and phosphorus and low in sulphur. An average analysis of the iron ore from the Chambers Mine is given below:

Values in per cent	
Iron	47.07
Silica	18.98
Lime	7.49
Magnesia	.25
Manganese	4.25
Phosphorus	.10
Sulphur	.02

Pearson Mine (2)

The Pearson mine is located a few hundred feet south of the Chambers deposit and is separated from it by a wide band of quartzite.

Two tunnels were driven northward from a small brook south of the Chambers deposit, on a band of limonite and siderite which varied from 16 to 20 feet in width. West of the tunnel the iron belt widened to 44 feet and was worked by open-pit methods with a 20-foot face. The rock along the northwest side of the open-pit is highly crumpled and contorted shale striking northeast and dipping steeply southward. The iron ore zone west of the tunnel strikes north 68 degrees east, and maintains its width and strike for some distance, and then turns more easterly, narrows and follows closely the south wall of the Chambers deposit. The total length of the iron ore zone is not known, but it was probably about 300 feet.

There is no record of the total output of the mine. The ore was low grade due to the unreplaced remnants of the country rocks and siderite. The iron content of the ore shipped to Londonderry during the latter part of 1906 was 43.87 per cent.

Origin of the Deposits

The Chambers and Pearson iron deposits occurred as lenticular masses within a fault zone cutting obliquely the stratification of the bordering shales and sandstones of the Carboniferous (Horton Group). They are regarded as secondary ore shoots derived from the alteration of siderite of hypogene origin. The process by which they were concentrated was probably as follows: First, meteoric waters attacked the upper portion of the original siderite, oxidizing the latter to limonite. In so doing the waters lost their dissolved oxygen and became carbonated. In this condition the waters dissolve siderite and transfer it to lower limits. Later the surface oxidation having been completed, waters charged with atmospheric oxygen percolate downward, mingle with the iron solutions previously formed, and precipitate limonite. By heat and pressure the limonite may be changed to hematite.

It is not known if barite formed a high percentage of the iron mineralization. Samples seen on the dumps contain some barite and it occurs as lenticles in the shale along the wall of the open-pit. Microscopic examination of the barite-siderite from the deposit west of the iron ore deposits indicate contemporaneous deposition for these minerals.

References

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Clifton Area

Clifton Iron Prospect (3)

Lat. 45° 20' 12"
Long: 63° 25' 17"
Ref. Map 11nbsp;E 6 West Half

The Clifton iron prospect (also referred to as the Old Barns property) is located on the farm of Mr. Allison McCurdy in western Colchester County, approximately 7 miles west of Truro. The workings are located one-quarter mile northwest of the junction of the roads leading to Beaver Brook and Black Rock.

The deposit was developed by two shafts, about 65 feet apart in 1873, and 497 tons of ore were shipped to Londonderry for smelting in 1879. In 1903 the prospect was re-opened and 300 tons of iron ore removed.

The geology of the area is imperfectly known due to the lack of rock exposures. On the basis of published information from the underground work of 1879 to 1903, the iron deposit occurs in sandstone and shale of the Horton Group and near the contact with the lower Windsor Group of marine sediments. Calcareous sandstone, conglomerate and shale of Triassic age occur north of the iron occurrence.

The iron mineralization is reported as being chiefly limonite, often botrxoidal, with some red hematite and ochre in a siliceous gangue. The mineralization was confined to a bed 6 feet thick in sandstone of the Horton Group. A microscopic examination of the mineralization from the dump shows the silica to be extremely fine-grained and free of any iron minerals. Extremely fine-grinding would be necessary to liberate the iron minerals.

A partial analysis was made in 1959 from hand picked samples of the ore from blocks on the dump near the shafts. The result is as follows:

Values in per cent

Iron	34.5
Silica	37.9
Phosphorus	0.06
Sulphur	Trace
Titanium dioxide	0.44

This deposit is of no economic value as a source of iron ore, even if a considerable tonnage could be developed, as the iron content is low and the silica content extremely high.

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The Londonderry Iron Area

Location

The Londonderry iron district is in Colchester County on the south flank of the Cobequid Mountains, between Debert and Portapique Rivers, a distance of about 14 miles. Most of the iron occurrences to a belt over a mile in width along the southern fringe of the Cobequid Mountains. (Fig. 2)

Figure: (Not presently available)
Figure 2. Index geological map, showing iron-bearing zone, Londonderry, Colchester County, Nova Scotia

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History

Mining of iron ore started in 1849, the first iron being made using six Catalan forges and a puddling furnace. A charcoal blast furnace was erected in 1852, which was in blast for several years, the works being known as the Acadia Charcoal Iron Works. In 1870 the first steel plant was erected and the forges abandoned. In 1874 Dr. Siemens made the first commercial experiment at this plant in the direct conversion of iron into steel. In 1877 a change was made from charcoal to coke as fuel and two furnaces were built. In 1874 the properties were purchased by the Steel Company of Canada, which ceased operations in 1899. In 1902 the Londonderry Iron and Mining Company, Limited, acquired the property and the mines and furnaces were operated from 1904 until 1908, since then no mining or smelting has been done in the district. Over 2 million tons of iron ore were produced from the various mines during their time of operation.

General Geology

The Cobequid Mountains are underlain by a complex group of sedimentary and volcanic rocks that are highly deformed by folding and faulting, and intruded by acid plutonic rocks and by minor basic intrusions. The volcanic and sedimentary rocks are pre-Carboniferous in age and consist of tuff, breccia, acid and basic flows, grey shale, and sandstone. Overlying this complex on the south and separated from it by a strong, well-defined westerly trending fault zone are sedimentary rocks of Pennsylvanian age. Farther south these rocks, in turn, are overlain unconformably by volcanic and sedimentary rocks, of Triassic age. The iron deposits are found in the pre-Carboniferous complex of the Cobequid Mountains.

The Cobequid Complex

The rocks of the Cobequid complex are divided into two groups, an older group of grey, slightly reddish brown weathering, well-bedded, sandy shales and a younger group consisting of sedimentary and volcanic rocks of various compositions. Intruding these rocks are large bodies of granite-gneiss and granite, and smaller masses of granite porphyry, diabase of which two ages are present, and minor intrusions of intermediate composition.

So far as is now known the older sedimentary rocks have no bearing on the occurrence of the iron deposits.

The iron deposits lie in the younger group of sedimentary and volcanic rocks that underlie the south flank of the Cobequid Mountains. The rock types found in the group are grey-black to pearl-grey, poorly bedded, fine grained sedimentary rocks or volcanic ash beds; grey shales, light grey to white quartzite or silicified tuff; chlorite schists showing varying degrees of alteration, and believed to be volcanic in origin; grey conglomerate and black graphitic schist.

In addition to the rock types enumerated above, the assemblage is cut by basic intrusive rocks of at least two ages and by dykes and masses of intermediate composition rocks. Along the north contact of the iron-bearing zone are several exposures of granite, diorite, syenite, quartz diorite, granite porphyry, and pegmatite. These intrusions, in their present position, have no bearing on the iron deposits, although it is probable that the solutions responsible for the formation of the primary ankerite bodies were related to one or another of them.

A zone with westerly striking lenses of ankerite and ferruginous carbonate lies about half a mile north of a major fault and continues parallel with it for 12 miles. The iron deposits are residual pockets of limonite, goethite, hematite, and specular hematite that have formed in these carbonate lenses as a result of leaching and enrichment by surface waters.

The Iron Deposits

The iron deposits consist of irregular masses of goethite, limonite, hematite, specular hematite, with minor siderite and ankerite. They occur entirely within the carbonate lenses, and reports indicate that all the deposits explored to depths below the zone of enrichment bottomed in fresh unaltered carbonate. In the lower parts of the ore masses, the iron oxides grade over some distance into fresh carbonate. No ore, even as stringers or offshoots, extends into the rocks adjacent to the carbonate bodies.

The carbonate bodies, according to Weeks (1948) form a series of roughly parallel lenses that have irregular boundaries, contain some inclusions of country rock, lack banding or distinctive internal structures, are medium to coarse-grained and vary in width from narrow stringers to masses 50 to 100 feet wide.

The primary carbonate bodies lie in close proximity to, and almost strictly parallel with the pre-Pennsylvanian fault marking the south face of the Cobequid Mountains. The deepest workings, and in fact all workings that were sunk below the zone of enrichment, bottomed in unaltered carbonates. This fact alone may be considered as strongly favouring a hypogene origin for the carbonate bodies.

The weathering of the carbonate bodies, the subsequent transportation downward of iron-rich solutions by percolating surface waters, and the later deposition in the carbonate bodies of various iron oxide minerals from these solutions, gave origin to lenses in the carbonate that could profitably be mined as ores of iron. The products of this supergene enrichment are mostly forms of limonite, together with small amounts of hematite and possibly some siderite.

Several varieties of iron ore are described. Paint ore is yellow-brown, earthly, ochreous limonite, and is found on or within a few feet of the surface. The botryoidal limonite ore "bottle ore" was quantitatively of minor importance and consisted of hard brown masses that were present mainly near the surface or in cavities and openings in the "paint ore". Red ore is red, earthly hematite and was rather uncommon. "White ore" is siderite, sufficiently free form ankerite to be classed as low-grade ore. A number of thin, 1/2 inch-wide, vein-like masses of specular hematite are present in the ore and in the carbonate bodies. The specular ore is fine to coarse, and occurred in large pockets of many tons. Specularite is very common in the Pine-Totten Brook district, particularly in the old workings on Peter Totten Meadow. It occurs in fair amounts in dump rock on Cumberland Brook. It was suggested that the non-proximity of intrusive rocks on the surface does not necessarily indicate that such intrusive rocks are not nearby in depth, and it may be that the zones showing abundant specularite (a high temperature mineral) in the carbonate are in reality closer to the parent source of the carbonate (and specularite) than are those zones in which the mineral is less common.

Origin of Deposits

Weeks (1948) discussed the origin of the iron deposits in considerable detail and concluded that:

a. "a hypogene replacement origin is favoured for the carbonate lenses;
b. the weathering of the carbonate bodies, the subsequent transportation downward of iron-rich solutions by percolating surface waters, and the later deposition in the carbonate bodies of various iron oxide minerals from these solutions, gave origin to lenses in the carbonate that could profitably be mined as ores of iron;
c. carbonic acid and carbonated surface waters were the principal agents that dissolved the carbonate rocks, transported the iron and precipitated it as oxides, and removed other constituents.

In arriving at these conclusions he gave particular consideration to the facts that no diabase dykes cut the carbonate masses although they are present in the adjacent enclosing rock; that the oxide masses are confined to the carbonate lenses and bottom in them, and the boundaries between iron oxide and carbonate are gradational and irregular; the depth of iron oxide enrichment seems to be related to the present topography and water table; and, the zone is well explored by underground workings and reports describing these corroborate the geological facts outlined".

Description of Mines

The principal mines in the area are the East, Old Mountain and West Mine. West of West

Mines, the Cumberland Brook deposit extends westward towards Matheson Brook and was opened by No. 1, No. 2 north and No. 2 south levels. On the west side of Martin Brook (in the west side workings), a shaft 400 feet deep had iron oxides to the bottom. At Cook Brook farther east seven levels were run, but only an unimportant tonnage of ore was found. The country between Old Mountain and East Mines has been but slightly explored up to the present (Fig. 2).

East Mines (4)

Lat: 45° 29' 30"
Long: 63° 30' 20"
Ref. Map: 11nbsp;E 5 East Half

Beginning at Slack Brook (see Figure 2 and Figure 3) on the west, a continuous series of surface and underground workings extend east to Gory Brook, the total distance through which they are uninterrupted being 2,900 feet. Much of the earlier work was quarrying. The longest of these pits is that at Gory Brook, running from the Reid to the McLean workings, 650 feet. Practically continuous with it on the west are two other quarries, giving a total length of 1,100 feet.

Figure: (Not presently available)
Figure 3. Map and partial section of East Mines, Londonderry, Colchester County, Nova Scotia

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The mouth of the old Slack Brook level was on the west side of Slack Brook and was run in a northeast and east direction under the creek towards the west end of the Gory Brook workings, the total distance being about 2,250 feet. The first 1,200 feet was in rock, the rest in ore, but little stoping was done. North of it is the "Patrigan" level, a rock adit driven northward for 120 feet and just reaching into ore, which is a mixture of ankerite and brown ore. The relation of the two levels indicates that the ore follows two zones, which are, at this point, about 400 feet apart and converging eastward, coming practically together at Gory Brook.

The Gory Brook workings consist of a rock adit which runs northward for 175 feet, then divides, one branch going northwest and west, the other northeast and east, the two being connected by a drift along the ore. Two levels have been worked. The upper is 50 to 100 feet below the surface with a considerable amount of stoping. The lower is a continuation of the Slack Brook level and is connected with the upper level by shafts and raises. The upper level yielded a much larger proportion of ore, while the lower level showed chiefly ankerite with small pockets of brown ore. The extreme distance of the lower workings from the surface is 175 feet.

The other workings are at Weatherbe Brook about 1/2 mile east of Gory Brook. Here the productive zone comes to the edge of the Devonian and on the north side ore outcrops against the Carboniferous grits to the south. Very many surface pits are opened, none, however, so extensive as those at Gory Brook. The underground development consists of one long level and several very short ones. The Weatherbe or No. 1 level starts from well up on the hillside, and extends northeast for 350 feet to the ore zone; thence a level runs irregularly eastward along the ore, and the main level continues northeast and north into a second ore zone at a distance of 400 to 500 feet from the first, there spreading east and west. Some stoping was done along this level. The ore mined was made up of ankerite, siderite, paint or brown ore, and a small amount of specular ore. The last was erratically distributed in small and local veinlets in the brown ore, and especially in the carbonates, with the result that the iron content of the ore was quite variable.

The veins in the East Mines are much brecciated, and the wallrock of green slates was found in the ore as angular horses at many points.

Pine Hill Brook Iron (5)

Lat: 45° 29' 45"
Long: 63° 29' 18"
Ref. Map: 11nbsp;E 6 West Half

A mineralized zone in altered slate is exposed in the bed of Pine Hill Brook north of a bridge on a road about 3/4 mile north of the continuation of the base line road. A vein of ankerite, including 1 to 2 feet of parting rock, measures 6 feet thick. Old workings, including a short tunnel and some open-cuts were found on the steep hillside along the strike of the vein eastward. The most extensive workings are at the top of the hill at what is known as the Barn Hill lot. The vein is exposed here for a width of from 30 to 50 feet. A marsh to the north of the exposure does not admit accurate measurements of the vein. The vein strikes about east-northeast and dips steeply to the south., No workable quantity of the oxides occur, the ankerite being in a fresh state. Specular hematite was scattered through the ankerite in stringers and isolated masses.

Totten Brook Iron (6)

Lat: 45° 29' 57"
Long: 63° 28' 29"
Ref. Map: 11nbsp;E 6 West Half

A prospect pit occurs on the east side of Totten Brook 3/4 mile north of the highway known as the Base Line road. It is a brown ore, but too little work has been done to indicate the size of the deposit. About half a mile farther up stream the Totten Meadow workings are found. An underground level is caved in and an open-cut above exposes a fault which has brecciated the ankerite vein itself. A fault breccia about 25 feet thick is made up of fragments of sedimentary rocks, and fragments of vein material measuring up to 18 inches across and surrounded by finely comminuted fault breccia. It is evident that considerable movement has taken place at this point since the iron minerals were deposited.

A small about of brown ore has been mined from this locality. While the vein is well mineralized no large bodies of ore were obtained. On the south side of the meadow there are outcrops of igneous rock. Barite is associated with the iron mineralization.

Average samples of Totten Brook ore:			**East Mines**
	Values in per cent		
	(I)	(II)	(III)
Iron	26.45	39.08	46.73
Silica	3.00	5.48	11.97
Lime	22.90	12.76	5.05
Alumina	3.71	- - -	3.90

Manganese	1.51	- - -	3.90
Manganese	1.51	2.10	1.55
Magnesia	2.88	1.36	.80
Volatile Matter	- - -	18.04	10.24

Old Mountain Mine (7)

Lat: 45° 29' 00"
Long: 63° 37' 18"
Ref. Map: 11nbsp;E 5 East Half

This section of underground workings lies on the steep west bank of Great Village River about 3,000 feet north of the bridge on the Base Line road. The best ore from the locality was mined from the Old Mountain deposit.

There were four principal levels. These all extend westward toward Cook Brook, and are numbered from south to north 4, 1, 2 to 3. The width, north and south, occupied by the old working is slightly over 1,000 feet, and the extreme length from the first workings on the river bank to the end of No. 2 level, is approximately 1,800 feet (Fig. 4).

Figure: (Not presently available)
Figure 4. Plan and section of surface and underground workings, Cook's Brook and Old Mountain, Londonderry, Nova Scotia

No. 4, the southern level, starts 300 feet west of the river and at an altitude of 425 feet. It was run largely in ore, but little stoping was done. The end of the level is 400 feet west of the mouth, and the direction quite irregular. Two very short levels, No. 5 to 6, have been driven into the hillside below No. 4 level, but evidently with negative results.

North of No. 4 is No. 1, one of the two main workings of the Old Mountain Mine. This starts 800 feet west of the river, at an altitude of 532 feet. The tunneling on No. 1 level was alternately in rock and ore, the latter occurring in several not well defined veins and pockets. A very noticeable feature is the large ankerite quarry showing a length east and west of 200 feet, and a breadth of 125 feet.

Five hundred feet north of No. 4 is No. 2 level, at an altitude of 533 feet. This is the second working of importance, extending to a point, 1,050 feet west of its portal. Like No. 1, it is stoped out to the surface in places.

The northernmost level, No. 3, starts at a distance of 750 feet from the river. It extends westward about 1,100 feet. Owing to its great sinuosity the tunnel is, however, in reality much longer. Its first course takes it 200 feet north of No. 2 to the Gallagher workings, where considerable stoping was done. Thence the drift works gradually south to a point under No. 2 to on the same ore, where a large amount of iron ore was encountered.

Cook Brook Iron (8)

Lat: 45° 27' 37"

Long: 63° 44' 35"
Ref. Map: 11nbsp;E 5 East Half

The workings at Cook Brook did not develop much ore, although the tunneling has been quite extensive. Seven levels have been run, three to the west side and four on the east (Fig. 4). The lowest are No. 1 west and No. 1 east, starting almost at the level of the brook. Both are straight in their course, and developed little ore, being run largely in rock. No. 2 east and No. 2 west are upstream from the first two. Like those below, they run obliquely to the right and left into the bank of the stream, and they are developed largely in ore.

No. 4 level is the highest and farthest up stream, on the west side, its entrance having an elevation of 570 feet. It is developed almost entirely in ore. No. 3 to the Jonah level, the latter being old workings, extend northeastward from the east side of the stream at an elevation of 565 feet. They are connected, each having several branches and they contain almost the only stoping in the district. Information given regarding the distribution of ore on Cook Brook is very meagre. No ore has been mined below the local drainage level, and no positive evidence exists as to the downward limit of the oxides here.

The mineralization is not continuous between Cook Brook and Old Mountain workings. Slickensided rock walls terminated the vein abruptly at the western end of the Old Mountain level and it is probable that cross faults have dislocated the vein at this point, also that the original character of the fissure was wider and more shattered, due to the proximity of intrusive plutonic rocks.

West Mines (9)

Lat: 45° 28' 50"
Long: 63° 39' 00"
Ref. Map: 11nbsp;E 5 East Half

The most extensive workings are those extending from Cumberland Brook to Martin Brook, and called as a whole, West Mines (Fig. 5). The upper or No. 5 level extends from one brook to the other, a length of over 4,300 feet in a straight line, and a considerably greater distance by tunnel through the sinuosity of the latter. The drift was run in ore and all the good ore was stoped out to the surface.

Figure: (Not presently available)
Figure 5. Map and longitudinal section of West Mines (Cumberland Brook and Martin's Brook), Londonderry, Nova Scotia

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The deposit was tapped by three vertical shafts which have now caved. The Dufferin shaft is located 1,340 feet east of the west end of No. 5 level, and extends 310 feet down to No. 9 level, the bottom of the workings at this point. The McClellan shaft is 820 feet east of the former and is 280 feet deep. The Engine shaft is 225 feet east of the McClellan and is 225 feet deep.

The deepest mining of the whole range is at the Jamme shaft west of Martin Brook where a depth of 300 feet below the level of the brook had been reached. It is stated that in these and the Cumberland workings not only does the ore become lean downward, turning to carbonates, but the proportion of sulphur increases rapidly.

Brooking Mine (Derry Hematite) (10)

Lat: 45° 29' 30"
Long: 63° 37' 25"
Ref. Map: 11nbsp;E 5 East Half

About 1/2 mile north of Old Mountain mines, and on the steep north bank of a tributary of Great Village River, a body of flinty black hematite was discovered lying between the almost vertical contact of coarse grained diorite on the north and sedimentary rocks on the south. An open cut was sunk 10 or 15 feet on the outcrop of the ore, and an adit driven to intersect the body from a point farther down the hillside. It seems probable that the hematite of the Brooking mine owes its origin to the diorite intrusive. A drill hole (Fig. 6) was put down at an angle of 52 degrees to intersect the mineralization at a depth of around 200 feet under No. 1 adit, at which depth the diorite was entered without hitting any ore.

Figure: (Not presently available)
Figure 6. Section showing the Derry ore body and borehole, Londonderry, Nova Scotia

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The total tonnage of hematite mined is not known but was not great. Microscopic examination of polished sections indicates that the finely mineralized hematite is closely associated with silica and could not be successfully beneficiated.

In 1966, Ran-Lux Mines Limited, drilled a hole on Tract 102, Claim O, Map Reference 11nbsp;E 5 D, to explore the area of the Brooking or Derry hematite. This hole was located just north of the Brooking fault and drilled north. Sporadic soil samples indicate the presence of copper, lead and zinc and widespread barite float is common within the general area.

This hole (262' at 50°N, 1966), intersected highly brecciated argillite and quartzites partially replaced by irregular blebs and stringers of specular hematite and magnetite. Quartz, barite, marcasite and dolomite are commonly associated minerals with the magnetite and hematite.

A number of partial chemical analyses are compiled to indicate the character of the ore:

Values in per cent						
	(I)	(II)	(III)	(IV)	(V)	(VI)
Iron	35.64	41.05	41.17	43.20	36.65	51.00
Silica	45.39	25.60	25.18	29.21	32.49	19.00
Alumina	1.37	- - - -	- - - -	- - - -	- - - -	- - - -
Lime	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -
Phosphorus	- - - -	0.21	- - - -	- - - -	- - - -	- - - -
Sulphur	.48	2.90	3.08	2.75	2.88	- - - -

Summary of Londonderry Iron Deposits

The iron deposits occur in a fissure vein traversing sediments of early Palaeozoic, probably Silurian or Devonian age. The fissured zone was formed during the period of earth movements accompanying the intrusion of plutonic rocks in Devonian time.

The most important iron-bearing minerals are ankerite and siderite thought to have been derived from a plutonic magma and deposited by solutions at a sufficient distance from the heated mass to allow them to cool and to be deposited in their present form as carbonates.

The mineralized zone, formed as it was along a line of weakness in the earth's crust, suffered subsequent dislocations during periods of diastrophism probably beginning with the Carboniferous. Denudation gradually exposed the shattered veins and the carbonates of iron were oxidized to limonites producing yellow, red and brown ochres, both on the surface and in deeper deposits along fissures in the veins. Carbonated waters dissolved and transported some of the iron, redepositing it in the form of botryoidal limonite, hematite and possibly in other forms similar to bog ore. The workable ore consists of these secondary hydrated oxides of iron.

The ankerite and siderite, and associated secondary oxides of iron ore, in general, restricted to a variable width of less than 100 feet, but at certain localities pocket deposits occur scattered over a wider area. The mineralization has a general east-west strike and dips steeply to the south. The dip varies and at some points flattens to about 45 degrees. The associated sediments are altered, light green, soft, clay slate and quartzite. These have also a general steep dip southward and it is only at certain points that the fissure is seen definitely cutting across these beds.

There is probably a genetic relationship between the iron-rich plutonics and the iron ore veins where structural conditions are favourable.

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Other Iron Occurrences

Matheson Brook (Coolan) Iron (11)

Lat: 45° 28' 30"
Long: 63° 41' 30"
Ref. Map 11nbsp;E 5 East Half

Matheson Brook is about 1 1/2 miles west of Cumberland Brook, Londonderry area, Colchester County. In 1942 the area was prospected by Mr. George Coolan, operating for Dominion Steel Company.

Several shallow pits were sunk on the flat top of the mountain about 1/2 mile west of Matheson Brook, and about 1 mile north of the Base Line road. In addition a short adit was driven into the hillside on the west bank of the brook at a point where the flat top of the mountain gives way to steep slopes down to the lower land to the south. The adit was driven at a point where several stringers of specularite were visible on the cliff, and a few more stringers were exposed in the adit, but nothing of economic significance. The specularite stringers are considered to be altered veinlets of siderite.

On Whetstone Brook, a tiny tributary of Matheson Brook and 1 mile north of the Base Line road two showings of specularite were uncovered. In the western pit, about 200 feet from the confluence of the two brooks, is a vein of oxidized iron carbonates about 6 inches wide and striking north. The eastern pit showed some oxidized carbonates in the dump.

Reference

Weeks, L. J., 1948:
Londonderry and Bass River map-areas, Colchester and Hants Counties, Nova Scotia; Geol. Surv. Can., Memoir 245, p. 42.

Iron Prospect North of Lower Five Island (12)

Lat: 45° 26' 28"
Long: 64° 04' 30"
Ref. Map: 21nbsp;H 8 East Half

About 2 miles north of Route 2 at Lower Five Islands an occurrence of specularite was discovered by Mr. G. A. Coolan.

The specularite mineralization lies in a brecciated zone in a fine grained rock which may be a rhyolite lava. It strikes south 60 degrees east and dips northward. The width of the breccia exposed by pitting is about seven feet and can be traced for some hundreds of feet to the west. The mineralization consists of specularite veinlets which reach a width of 3 or 4 inches in places. These veinlets pinch and swell and cannot be considered as a source of iron. These are also quartz veinlets associated with the specularite which carry sulphides, chiefly pyrite.

Reference

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Gerrish Mountain Magnetite (13)

Lat: 45° 24′ 30"
Long: 63° 59′ 55"
Ref. Map: 11nbsp;E 5 West Half

The amygdaloidal basalt exposed on Gerrish Mountain, Cape D'Or, Cape Sharp, and at other points on Minas Basin contains masses and veins of magnetic iron ore, one foot wide and under, exceedingly irregular in their course and often terminating abruptly.

Systematic search was begun in 1883 on the deposits of magnetic iron on Gerrish Mountain, 6 miles west of Economy River and 300 feet west of Route 2.

Two small shafts were sunk on the deposit about 70 years ago and about 40 tons of magnetite occur in the dumps. In 1906 some of the magnetite ore was shipped to the blast furnace at Londonderry, Colchester County. The deposit was examined in 1906 by Woodman and an analysis made of a sample is as follows:

	Values in per cent
Iron	56.09
Silica	17.18
Alumina	0.10
Lime	0.35
Magnesia	2.02
Phosphorus	0.21
Sulphur	0.50

Late in 1960, a magnetometer survey and 3 diamond drill holes totalling 576 feet were completed to test the extent of the magnetic mineralization on Tract 25. The field investigations demonstrated that the vertical continuity of the magnetite vein is less than 50 feet and that it occurs in lens-like form. The basalt occurs as a rather flat-lying sill highly fractured and approximately 75 feet in thickness in this area. The data from the field work is shown on maps available as a blue print at the Department of Mines, Halifax.

A microscopic examination of the iron ore from Gerrish Mountain shows it to be composed largely of pure, coarsely mineralized magnetite with some usually coarse silica, liberation of which by coarse crushing down to 3/4 of an inch could be easily accomplished and separation by gravity would then be possible.

At many places in the Triassic basalt along the Bay of Fundy magnetite and magnetic hematite occur in pockets a foot or so wide and a few feet long. Occurrences are recorded near Scots Bay Village, at Vernon Mines northwest of Kentville and north of Berwick. These deposits are of no economic importance.

References

Fletcher, H., 1892:
Report on geological explorations and surveys in the Counties of Pictou and Colchester, Nova Scotia: Geol. Surv. Can., Ann. Rept., Vol. V, pt. P, p. 36.

Woodman, J. E., 1909:

The Iron deposits of Nova Scotia; Mines Branch, Canada, Rept. No. 20, p. 131.

Weeks, L. J., 1948:
Londonderry and Bass River map-areas, Colchester and Hants Counties, Nova Scotia; Geol. Surv. Can., Memoir 245, p. 61-62.

Bass River Magnetite Deposit (14)

Lat: 45° 27' 55"
Long: 63° 46' 45"
Ref. Map: 11nbsp;E 5 West Half

A deposit of magnetite was discovered late in the nineteen thirties on the west side of Bass River, approximately three miles north of the village of Bass River. The area was prospected in detail in 1954 to a dip needle survey was made to outline the extent of the magnetite (Fig. 7).

Figure: (Not presently available)

Figure 7. Dip needle survey of iron deposit, Bass River, Colchester County, Nova Scotia

The rocks exposed in the area are hornblende paragneiss, quartzite, tuffs, and sandstone of pre-Carboniferous age intruded by basic intrusives of Triassic age. Trenching confirmed the presence of magnetite and pyrite across a width varying from 30 to 200 feet and for a length of 1400 feet. About 10 per cent of the mineralization is pyrite, the remainder being magnetite. The mineralization occurs in lenticular form and is estimated to carry about 40 per cent metallic iron. The high sulphur content would be detrimental for its use as iron ore.

References

Mullan, A. W., 1954:
Report on water testing and preliminary prospecting, Londonderry claims for McPhar Geophysics, p. 9. Copy on file with N. S. Dept. of Mines.

Weeks, L. J., 1948:
Londonderry and Bass River map-areas, Colchester and Hants Counties, Nova Scotia, Geol. Surv. Can., Memoir 245, p. 62.

Newton Mills Iron Occurrence (15)

Lat: 45° 13' 40"
Long: 62° 55' 25"
Ref. Map: 11nbsp;E 2 West Half

At Newton Mills, Upper Stewiacke, Colchester County, the New Glasgow Coal, Iron and Railway Company explored in 1891, a deposit of hematite. Several hundred tons were mined. The extent of the deposit is not known as the workings are now overgrown and the pits caved.

The rocks exposed south of the deposit are quartzite and slate of the Meguma Group, of possible Ordovician age, overlain unconformably by limestone and conglomerate of

Carboniferous age. The major structure of the area is a northeasterly trending syncline.

The hematite is in a basal conglomerate of the Pembroke Formation of the Windsor Group. In places the hematite has penetrated the joints of the underlying slates and reddened them for some distance. The few analyses available indicate the tenor of the iron mineralization.

	Values in per cent	
	(I)	(II)
Iron	48.50	42.27
Silica	22.70	29.97
Alumina	5.81	6.64
Magnesia	0.28	Tr.
Lime	0.49	0.34
Phosphorus	0.01	0.01
Sulphur	0.15	0.16

References

Faribault, E. R., 1899:
Geol. Surv. Can.; Upper Musquodoboit Sheet No. 49, Colchester and Halifax Counties, Nova Scotia.

Gilpin, E., Jr., 1891:
The Iron ores of Nova Scotia; Proc. and Trans. of the Can. Soc. of Civil Eng., Vol. 5, Pt. 1, p. 17.

Ingall, E. D., 1898:
Iron ores of Nova Scotia, Geol. Surv. of Can., Ann. Rept., Vol. 10, p. 100 to 101.

Upper Kemptown Iron Deposit (16)

Lat: 45° 29' 50"
Long: 63° 05' 27"
Ref. Map: 11nbsp;E 6 East Half

The iron deposit is located in Upper Kemptown, approximately 1,000 feet east of the Kemptown-New Annan road, and roughly 14 miles northeast of Truro, Colchester County.

The deposit was discovered around 1889 to considerable development work was done at that time. The most extensive development work was carried out during the period 1904-1907.

Trial pits proved the existence of iron mineralization for a distance of about 3 miles, the deposits resembling somewhat those of Londonderry in Colchester County. The ore is mostly limonite, but specular hematite is cut at some places. On the Monroe property, which is towards the eastern extension of the beds, a shaft has been sunk on the ore which occurs in a zone of considerable thickness. It consists mainly of limonite, with about a foot of specular hematite on the footwall. Nearby is the McKay shaft or pit, showing specular hematite. Continuing westward on the strike of the bed, limonite was found in other pits.

The iron mineralization occurs in fractures and lenses in sandstone of the Canso Group of Upper Mississippian age and consists chiefly of limonite with a minor amount of hematite.

Several partial analyses are available from reports issued by the Geological Survey of Canada and the Dominion Iron and Steel Company of Sydney, Nova Scotia.

Values in per cent					
	(I)	(II)	(III)	(IV)	(V)
Iron	60.40	58.94	60.60	58.42	55.70
Silica	2.28	7.84	.80	3.44	4.48
Phosphorus	.14	.06	.02	.70	.16
Sulphur	.08	.03	.03	.08	.05

References

Fletcher, H., 1891:
Ann. Rept. of Geol. Surv. of Canada, Vol. 5, Pt. 2, p. 177.

Midgley, J., 1911:
Report on Salmon River iron deposit in the Kemptown District, Colchester County, Dominion Iron and Steel Company, Sydney, Nova Scotia.

Chain Lake Prospect (17)

Lat: 45° 31' 00"
Long: 63° 55' 00"
Ref. Map: 11nbsp;E 12 West Half

This prospect is located 2 1/2 miles west of Economy Lake and 4 miles north of the outlet of Newton Lake. It can be reached from Collingwood Corner by car to Economy River and thence by trail.

The mineralization in the form of specularite (Fe_2O_3) occurs as small stringers up to an inch in width, in shale intruded by granitic rocks. The width of the area cut by these stringers although not accurately determined is possibly up to 50 feet. The mineralized area may have considerable areal extent as float has been traced on strike for three miles.

Reference

Douglas, G. V., 1941:
Report to Nova Scotia Department of Mines (on file).

West Economy River Iron (18)

Lat: 45° 28' 30"
Long: 63° 56' 07"
Ref. Map: 11nbsp;E 5 West Half

This iron occurrence is located approximately 1,400 feet above the junction of West Economy River and Economy River, Colchester County.

Specularite is found in stringers not over 1/2 inch wide in a slate and tuff inclusion which is in a fine grained aplitic granite related to the main granite intrusion a short distance to the south. Many occurrences of this type of mineralization were observed by the writer during field studies in the Londonderry area over several years. None of the deposits of this type are extensive enough to be of economic importance.

Reference

Weeks, L. J., 1948:
Londonderry and Bass River map-area, Colchester and Hants Counties, Geol. Surv. Can., Memoir 245, p. 61 with accompanying map 867A, Bass River.

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Cumberland County

Port Howe Iron Occurrence (19)

Lat: 45° 50' 18"
Long: 63° 46' 00"
Ref. Map: 11nbsp;E 13 West Half

Numerous pieces of limonite of good quality were found as float on the DeWolfe property which is on the west side of the main road between Oxford and Port Howe. Several drill holes have been sunk through 18 feet of overburden to bedrock but the source of the ore has not been found. The rock found in the brook in this area is medium-grained red ferruginous sandstone striking S80°E with a dip of 14 degrees north. An outcrop of limonite is reported to be exposed in the bed of River Philip in this area at low tide. Assays of float are reported to give 68.05 per cent iron.

Reference

Goudge, M. G., 1938:
Report to Nova Scotia Department of Mines, Anne. Rept.

Iron Occurrence Near Greenhill (20)

Lat: 45° 23' 00"
Long: 64° 16' 00"
Ref. Map: 21nbsp;H 8 West Half

This showing is exposed on the north shore of Chignecto Channel at Green Hill about 3 miles southeast from Parrsboro, Cumberland County.

The specular hematite occurs on a bluff 60 to 70 feet in height, composed of sandstone, slate and conglomerate. These formations lie close to a large intrusion or sill of Triassic basic lava so that the rocks are highly metamorphosed and badly mashed. About 25 feet up the bluff a knob of specular hematite 4 feet across can be seen protruding from loose decomposed rock and surface material which covers the steep slope. Portions of this 4-foot belt are high grade hematite while some of it is highly stained decomposed slate and sandstone. The rocks in this section are so broken and twisted that it is improbable that a strong vein of any extent would be present. The conglomerate along the shore in this section is iron stained, while small patches of specular hematite may be seen at various places along the shore towards Clarke's

Head.

Reference

Goudge, M. G., 1940:
Nova Scotia Dept. of Mines, Ann. Rept., p. 56.

Canfield Creek Iron (21)

Lat: 45° 47' 38"
Long: 63° 40' 05"
Ref. Map: 11nbsp;E 13 East Half

This deposit is situated on Canfield Creek some 4 miles by river from the village of Pugwash, Cumberland County. Development work was carried on intermittently from 1877 to 1902.

The mineralization is reported to have been opened up by the Londonderry Iron Company about 1877, and some tons of limonite shipped to Londonderry for smelting. It was subsequently prospected by the Dominion Steel Company.

An 18-foot shaft was put down about 50 feet from the old workings of the Londonderry Company. Ore was encountered but additional sinking proved it to be a large boulder bedded in the clay. This shaft did not reach bedrock.

Two adits, 20 to 44 feet in length, respectively, driven into the bank on either side of the shaft, failed to disclose more than isolated lenses of iron ore.

An 80-foot trench between the shaft and the first adit disclosed ore but a 22-foot shaft put down on this exposure proved it to be an isolated lens in the clay. Three other pits covering the intervening area failed to show iron ore.

Shafts put down adjacent to the old workings showed that the indicated ore was simply a pocket four feet in thickness and two to three feet in width.

References

Piers, H., 1906:
Economic minerals of Nova Scotia, Department of Public Works and Mines, catalogue and description, Provincial Exhibition, p. 34.

Fletcher, H., 1906:
Pugwash Sheet, Cumberland County, No. 61, Geol. Surv. of Canada.

Bog Iron Ore at Wallace Highland (22)

Lat: 45° 43' 45"
Long: 63° 27' 30"
Ref. Map: 11nbsp;E 11 West Half

The following remarks are taken from a report by G. V. Douglas. "The location of the deposit is in a cultivated field 1,000 feet north of the intersection of the East Logan Road and the Wallace-Grant, Wallace Highlands Road. There are two deposits known on the east side of the road, and some indications on the west side of this north-south road. The deposits on the east side of the road are on the lands of Mr. William Eachern. The area is rather flat with a gentle slope to the north.

The surface soil is a sandy clay, undoubtedly morainic, from which most of the boulders have been picked by some generations of farmers.

There are no outcrops of solid rock, but according to the geological sheet of the area, the till rests on upper or middle Carboniferous sediments.

The deposit consist of hard, cellular masses of mixed manganese and iron oxides, which occur as limited tabular masses in till. The largest manganese occurrence measured about 100 feet by 50 feet.

A pit was dug through the centre of this occurrence and the total thickness of mixed oxides was 2 feet. The ditch on the side of the road and the various ditches crossing the fields showed no indication of manganese and iron, except at two points on the west side of the road, in a cattle run. At one of these points, there was a small patch with some disintegrated mineral and, close by, a small spring was bringing up and depositing, a jelly-like mass of ferruginous material which, when dried out, will become limonite. Possibly there is manganese with this iron".

"The 1940 Mines Report, Province of Nova Scotia, (page 61) gives the chemical analysis of a sample taken from this deposit by J. P. Messervey, as manganese 15 per cent, iron 32.6 per cent. These results indicate that the deposit is not of economic value".

Reference

Douglas, G. V., 1942:
Ann. Rept. N. S. Dept. of Mines, p. 92.

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Antigonish County

The main iron ore beds of Antigonish County occur in the hills about 1 1/2 miles south of the village of Arisaig, on the shore of the Gulf of St. Lawrence. The remainder of the iron ore deposits occur at scattered localities.

History

The first recorded information on this district is contained in the report of the commissioner of Mines for Nova Scotia for 1874 who states that at Arisaig, near the pier, a bed of hematite 3 feet wide has been exposed.

The only serious attempt to work the iron prospects was in 1893, when the Nova Scotia Steel and Coal Company opened up a portion of the deposit. The work was chiefly on the tunnel lead, between Iron and McInnes Brooks. The Trunk road iron prospect consists of two small openings on either side of Arisaig Brook, in Silurian sediments. Operations ceased in 1895. In 1894, 1,376 tons were delivered to the furnace at Ferrona, Pictou County.

In 1910 extensive prospecting was carried on in the western part of the area by the Arisaig Iron Company, but no ore was taken out.

Geology

Three groups of rocks are represented in the immediate vicinity of the iron-bearing beds. The oldest is the James River Formation of Ordovician age, a series of interbedded greywacke and slate, the latter probably predominating. Toward the top of the formation and also probably at a lower horizon, iron ore beds occur, and in one instance a tuff bed is associated with the iron. In the vicinity of Doctors Brook at lease three "beds" of iron ore have been discovered and although varying in thickness from place to place, the "beds" have been shown to extend in a northeast direction a distance of more than 3 miles. These beds vary from 10 feet to less than 1 foot in thickness, the thicker beds consisting of iron impregnated grit and the thinner beds being made up of oolitic hematite. The dip of the strata is nearly vertical, and strikes northeasterly.

The history of the region opens in lower Ordovician time with a long period of sedimentation. The thick deposits of greywacke or impure quartzite interbedded with banded slate imply the existence of a shallow transgressing sea during the deposition of the James River Formation. When the upper part of the James River Formation was being laid down, there existed conditions favourable for the deposition of iron, such as a shallow sea rich in iron solutions. Between beds of impure sand, oolitic iron oxide was deposited in beds none of which exceeded 10 feet in thickness. In the muddy ferruginous waters of this time, a few brachiopods were able to live. Great igneous activity occurred at the close of the lower Ordovician. Basalt and diabase intrude the James River Formation near the iron beds.

The Ordovician age rocks are highly metamorphosed and have been folded into anticlines and synclines with a general strike to the northeast. Minor folds extending north and south also exist. These rocks (James River Formation) are the oldest known in the district and are evidently of marine origin. On the evidence of the fossils found they belong to the lower Ordovician period and the iron ore occurring in them may be directly correlated with the deposits of iron at Wabana, Newfoundland.

North of the Ordovician series is a canoe-shaped synclinal basin of Silurian rocks. In this series occur the iron deposits of Arisaig Brook (Trunk road) and Ross Brook.

The third group is a series of basic eruptives and pyroclastics. South of the old iron pits, east of McInnes Brook, they come in as green agglomerate and tuffs. At Iron Brook they form the south wall of the most southerly of the iron ore beds. Beside these tuffs and agglomerates, areas of massive greenstone and diabase occur north of the iron beds.

The iron beds of the Doctors Brook area are three in number and vary from 2 to 8 feet in average thickness. The widest bed is very siliceous, but the thinner beds are freely oolitic, sparingly fossiliferous, and contain a fair percentage of iron (40-48 per cent). The iron beds have been traced for about 3 miles. Numerous small faults intercept the ore and its thickness is variable. The iron beds strike in a northeast direction and are approximately vertical in dip. The three beds, going from north to south, are called the Tunnel or No. 1 lead, the intermediate or No. 2 lead, and the most southerly, the coarse or No. 3 lead.

Arisaig Area

Tunnel Lead or No. 1 (23)

Lat: 45° 45' 30"
Long: 62° 08' 00"
Ref. Map: 11nbsp;E 16 East Half

The Tunnel lead has been traced for a distance of 6,750 feet, and it probably extends 2,400 feet farther east to the East Branch of Doctors Brook. The principal workings are to the east of McInnes Brook and within 1,000 feet of it. It was from this part of the Tunnel lead that the great bulk of the ore mined and shipped by the Nova Scotia Steel and Coal Company was extracted. The iron bed is 3 to 8 feet thick and is reported to have averaged 48 per cent iron. The dip of the lead is 65 to 70 degrees to the north.

The iron of the Tunnel lead consists of pebbles or irregular masses of coarsely oolitic red hematite, embedded in a matrix of slate and massive hematite. The quality of the ore depends on the proportion of slate in the matrix.

Analyses of Tunnel Lead Iron Ore

Values in per cent

	(I)	(II)	(III)	(IV)	(V)
Iron	43.5	47.15	52.37	49.06	47.30
Silica	24.6	18.19	13.64	16.13	17.48
Alumina	5.3	7.8	6.36	7.27	6.80
Lime	3.9	1.6	1.30	1.60	1.33
Magnesia	.12	.72	.46	.28	0.45
Phosphorus	1.23	.72	.48	.58	1.48
Sulphur	.004	.003	.013	.003	0.01

Intermediate or No. 2 Lead (23)

South of the Tunnel lead, at a distance usually less than 100 feet is the No. 2 lead. This is a 4-foot bed of siliceous hematite, which possible is continuous for a distance of about 8,000 feet.

The walls wherever exposed show quartzite on the south and slate on the north. Dip of the iron bed or lead various from vertical to 77 degrees north.

Analyses of Tunnel Lead Iron Ore

Values in per cent

	(I)	(II)	(III)	(IV)	(V)
Iron	53.27	45.00	41.40	40.87	43.56
Silica	12.00	28.40	- - - -	- - - -	14.75
Alumina	7.26	.84	- - - -	- - - -	7.17
Lime	2.00	1.05	- - - -	- - - -	2.10
Magnesia	.32	.42	- - - -	- - - -	0.44
Phosphorus	.84	.53	- - - -	- - - -	0.78
Sulphur	.01	.01	- - - -	- - - -	0.01

Coarse or No. 3 Lead (23)

The coarse or No. 3 lead is the most southerly of the three beds and is also the poorest. It is between 50 to 75 feet south of No. 2 bed and is probably about 6,000 feet in length. The width of the coarse lead varies from 4 to 11 feet. The walls in the western part of the field are quartzite, on both sides but eastward a greenish-grey tuffaceous rock forms the south wall.

The iron ore is very siliceous and coarse-grained, contains visible quartz particles and in places is oolitic. The iron content is low, the average being 35.16 per cent iron and 17.50 per cent silica.

In 1961, a request from private industry to the Department of Mines for some authentic data on the iron occurrences at Doctors Brook led to an examination of the various showings exposed. At most showings, due to the trenches being caved, it was impossible to make an assessment of the iron occurrences. It was then decided diamond drilling was the most economical means in making an economical evaluation of the iron occurrences.

Three drill holes for a total of 1,358 feet of drilling investigated the iron horizons along a strike length of 1,200 feet. The plans of the drill holes with analyses are sufficient to illustrate the character of the iron mineralization at Doctors Brook (Fig. 8, Fig. 9, Fig. 10, and Fig. 11). Hole 4 intersected the iron beds 600 feet west of Hole 3 (Fig. 12).

Figure: (Not presently available)
Figure 8. Plan of drill holes, Doctors Brook iron beds, Antigonish County, Nova Scotia

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Figure: (Not presently available)
Figure 9. Section of drill hole No. 1, Doctors Brook iron beds, Antigonish County, Nova Scotia showing geology and analyses

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Figure: (Not presently available)
Figure 10. Section of drill hole No. 2, Doctors Brook iron beds, Antigonish County, Nova Scotia, showing geology and analyses

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Figure: (Not presently available)
Figure 11. Section of drill hole No. 3, Doctors Brook iron beds, Antigonish County, Nova Scotia, showing geology and analyses

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Figure: (Not presently available)
Figure 12. Section of drill hole No. 4, Doctors Brook iron beds, Antigonish County, Nova Scotia, showing geology and analyses

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Arisaig Brook Iron (24)

Lat: 45° 44' 00"
Long: 62° 10' 30"
Ref. Map: 11nbsp;E 9 East Half

A bed of iron ore slightly over 2 feet thick occurs in slate and sandstone near the base of the McAdam Formation of Silurian age, approximately 2,000 feet south of the highway on Arisaig Brook. The attitude of the strata is nearly vertical. Some ore has been removed from the bed. From its character, it is without doubt of sedimentary origin. The following analyses are available from the deposits on Arisaig Brook.

Values in per cent		
	(I)	(II)
Iron	35.26	35.62
Silica	17.6	- - - -
Alumina	7.0	- - - -
Lime	11.7	- - - -
Magnesia	.42	- - - -
Phosphorus	.85	- - - -
Sulphur	.019	- - - -

Analyses of a shipment of ore by Dominion Iron and Steel Company (1902) gave:

Values in per cent		
	(I)	(II)
Iron	52.9	52.34
Silica	11.6	16.10
Alumina	7.4	8.76
Phosphorus	.49	.37
Sulphur	- - - -	Tr.

Ross Brook Hematite (25)

Lat: 45° 45' 00"
Long: 62° 09' 30"
Ref. Map: 11nbsp;E 9 East Half

On Ross Brook, a few hundred yards to the east and almost directly on the strike of the Arisaig Brook opening is a tunnel in a bed of iron ore on the west bank of the brook. Two feet three inches of iron mineralization is exposed. An analysis of the iron mineralization is as follows:

Values in per cent	
Iron	46.38
Silica	23.56
Alumina	4.83
Calcium	1.65
Magnesia	0.22

Phosphorus	0.715
Sulphur	0.012

Browns Mountain Area

Iron Occurrence at Browns Mountain (26)

Lat: 45° 39' 00"
Long: 62° 09' 00"
Ref. Map: 11nbsp;E 9 East Half

In an area about 1 miles northeast of Browns Mountain post office, iron has been exposed at points over 3,000 feet apart. In the western prospect, an iron ore zone more than 20 feet wide was discovered. The bed dips south at about 60 degrees and the contained ore consists of coarse grit impregnated with hematite. In the walls the grit is finer textured than in the iron mineralization. In the eastern exposure the iron zone strikes nearly north and south and is only 5 feet wide and the ore is more compact and possibly higher grade. Specimens are said to have assayed as high as 30 per cent metallic iron. The iron of this vicinity appears to belong to a lower horizon in the James River Formation than that which contains the iron beds of Doctors Brook.

References

Fletcher, H., 1886:
Report on geological surveys and exploration in the counties of Guysborough, Antigonish and Pictou, Nova Scotia; Geol. Surv. of Canada, p. 115P.

Gilpin, E., Jr., 1891:
Trans-Can. Soc. of Civil Eng., Vol. V, 1891, p. 9.

Williams, M. Y., 1914:
Arisaig-Antigonish district, Nova Scotia, Geol. Surv. Canada, Memoir 60, p. 38, 142, Map No. 138A.

Woodman, J. E., 1909:
Report on the iron ore deposits of Nova Scotia, Part 1, Canada; Dept. of Mines, Mines Branch, p. 175-207.

Polson's Brook Hematite (27)

Lat: 45° 27' 10"
Long: 61° 53' 45"
Ref. Map: 11nbsp;F 5 West Half

The property is located on Polson's Brook about 2 miles east of the main Post Road running through South River Valley. It is approximately 18 miles from the town of Antigonish. Polson Brook is about 1 mile north of the Antigonish-Guysborough County line.

Records indicate that hematite was known to occur in this area since 1903. In 1927 two drill holes were put down by the New Glasgow Mining Company. The results were disappointing. The logs of the holes are tabulated on pages 59 to 60.

Most of the work performed prior to 1926 was on the north side of the Valley. On the south side of the Valley a tunnel was driven into the hill for a distance of 95 feet, and an incline slope known as McGillivray Shaft, 70 feet deep, was driven from a point about 20 feet farther upstream (Fig. 13).

Figure: (Not presently available)
Figure 13. Plan of McGillivray slopes and Bray and Monk shafts, Antigonish County, Nova Scotia

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Examination of the dumps revealed some good specimens of specular hematite and much rock with some impregnations and narrow bands of hematite through it.

Several analyses were reported by the New Glasgow Mining Company. These were probably hand-cobbed samples and have no bearing on the percentage of such high-grade iron occurring with the country rock at the points where the samples were taken.

Values in per cent				
	(I)	(II)	(III)	(IV)
Iron	66.22	64.85	62.17	64.68
Silica	- - - -	5.60	9.52	- - - -
Alumina	- - - -	- - - -	1.11	- - - -
Phosphorus	.02	- - - -	.016	.02
Sulphur	.70	- - - -	.053	1.13

Polson's Brook, Annual Report N. S. Dept. of Mines (1927), Logs of Diamond Drill Holes

Borehole No. 1, Record No. 516. Located on the farm of William J. Polson, Polson's Brook, Antigonish County, 274 feet in a west southwest direction from a borehole put down in 1903 in search of iron ore and 410 feet from northeast corner of barn of William Polson in a northeasterly direction. Drilling for New Glasgow Mining Company at Polson's Brook, Antigonish County. Iron ore being the mineral sought. The strata is almost vertical and full of fissures. Hole drilled vertically. Drill working single shift. Began hole July 18, 1927, finished hole August 27, 1927.

	Thickness		**Depth from Surface**	
Strata	**Ft.**	**In.**	**Ft.**	**In.**
Loam, gravel boulders	2	9	2	9
Blue and very hard quartzite	2	3	5	0
Blue and white quartzite with quartz streaks	17	11	22	11
Light grey slate and quartzite	20	1	43	0
Blue and white quartzite with quartz streaks	36	1	79	1
Blue, white and grey quartzite and slate streaks	7	8	86	9
Dark grey and soft shale	14	2	100	11

Light grey and white slate and quartz	13	7	114	6
Light grey and blue slate and quartzite	8	6	123	0
Light brown and hard quartzite	18	8	141	8
Blue and red quartzite and sandstone	6	3	147	11
Blue and white quartzite and sandstone	4	6	152	5

Borehole No. 2, Record No. 517 (1927, page 158). Located on farm of William J. Polson, Polson's Brook, Antigonish County, 258' 10" from Borehole No. 1 in a northeasterly direction and 32 feet in a west by north direction from Borehole No. 1, put down in 1903 in search of iron ore. The strata is almost vertical and full of fissures. Iron ore being the mineral sought.

	Thickness		**Depth from Surface**	
Strata	**Ft.**	**In.**	**Ft.**	**In.**
Loam, gravel and boulders	3	0	3	0
Grey and white slate and quartz with iron streaks	7	3	10	3
Red and black slate with iron streaks	8	0	18	3
Red, white and black slate and quartz with iron streaks	9	3	27	6
Hard Brownish rock	27	0	54	6
Light brownish rock	2	0	56	6
Hard brownish rock	3	0	59	6
Hard brownish rock with bands of whin	6	0	65	6
Light brown showing quartz and iron	8	0	73	6
Quartz with greenish streaks showing iron	1	0	74	6
Iron	0	3	74	9
Hard light brown rock with quartz	1	6	76	3
Hard white rock with quartz	10	3	86	6
Hard brownish rock showing iron	5	6	92	0
Hard white rock with quartz	3	6	95	6
Blue slate	5	0	100	6
Light brownish rock showing iron	2	0	102	6
Bands of blue slate, bands of light grey and hard brownish bands	2	6	105	0
Hard light grey rock showing quartz	3	9	108	9
Bluish slate showing quartz	8	4	117	1
Hard brownish rock showing iron	2	9	119	10
Hard white rock showing iron	3	0	122	10
Bluish slate showing quartz	5	8	128	6
Hard grey rock showing quartz	2	9	131	3

Bluish slate with quartz	12	3	143	6

Records indicate that a borehole was put down to a depth of 75 feet on the Polson's Brook property in 1903. It is reported that a thin bed of iron ore was cut near the bottom of the hole.

References

Messervey, J. P., 1960:
Report on iron ore property at Polson's Brook, Antigonish County, New Glasgow Mining Company Limited for Nova Scotia Department of Mines.

Report of Mines Nova Scotia, 1927:
Record of Boreholes, Polson's Brook, p. 157-158.

Report of Mines Nova Scotia, 1928:
Ann. Rept. N. S. D. M., p. 145.

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Guysborough County

Roman Valley Area

Lat: 45° 27' 30"
Long: 61° 42' 00"
Ref. Map: 11nbsp;F 5 East Half

General

Several shallow exploration shafts with very limited underground workings, most of which are at least 50 years old, were put down to test scattered showings of specular hematite occurring for 10 miles along the Guysborough River in Roman Valley. These deposits are on the north side of the river and from 8 to 14 miles from the town of Guysborough.

Some years previous to 1912 prospecting was carried on by New Glasgow interests, who put down two shafts in the area.

In 1912 the Dominion Iron and Steel Company extensively prospected the area, but all their work only indicated pockets of iron ore limited in extent.

In 1923 the Roman Valley Iron Company was formed to investigate the specular hematite deposits in this area. There is no available record of the results obtained from this work.

Geology

Much of the bedrock in the general area is a series of bedded green and purple argillites. At places it is extremely siliceous, constituting a very hard fine grained rock. Siliceous argillite forms the north wall of the Chisholm shaft, where it appears to be the footwall of the band that carries the specular iron. The age of these fine grained siliceous rocks is probably Mississippian.

In several nearby areas the argillite is cut by masses of diabase. A small outcrop of diabasic rock was noted along the banks of the river between the Chisholm shaft and the mouth of Mink Brook.

The specular iron is associated with a calcareous band of rock, the width of which could not be determined. This rock is coarsely crystalline. Associated with the calcite are smaller buff and brown colored particles that may originally have been crystals of basic composition subsequently altered. A rusty hue is imported to the weathered surface due to the oxidation of included iron. It is likely this band of rock was originally a diabase that subsequently was highly altered, thus introducing into it considerable calcite. In places it appears brecciated, suggesting that it occupies a fault zone. It is, therefore, possible that a band of diabase or the contact between a diabase and the siliceous green coloured rock, may have been the locus of a fault that penetrated deep enough to allow solutions to permeate through these rocks, thereby altering some of the primary minerals to calcite and introducing disseminated particles, streaks and masses of specular iron.

The iron ore is found in specular form, in thin veins or leads. It has a highly micaceous structure with a reddish brown streak.

There are four known deposits of specular hematite in the Roman Valley. No. 1 is on the farm known as Martin Doyle, the No. 2 about 3 miles east on the farm of William Atkens, No. 3 about 3/4 mile farther east on the farm of Alex Chisholm and No. 4 known as the Cunningham or Dumphy showing is a small vein of very little importance, a short distance east from No. 3 (Fig. 14).

Figure: (Not presently available)

Figure 14. Map of Roman Valley, Guysborough County, Nova Scotia, showing location of iron deposits

Doyle Prospect (28)

Lat: 45° 28' 00" (approximate)
Long: 61° 45' 15"
Ref. Map: 11nbsp;F 5 West Half

Work was done on the Doyle or No. 1 deposit by New Glasgow interests. They at one place, sunk a shaft to a depth of 30 feet and exposed a series of thin bands of specularite carrying quartz and calcite. The Steel Company of Canada considered this showing too poor to warrant further work.

Atkens Prospect (29)

Lat: 45° 27' 30"
Long: 61° 41' 20"
Ref. Map: 11nbsp;F 5 East Half

On the Atkens or No. 2 deposit considerable exploration was done by New Glasgow interests. They sank a 26-foot shaft and cut two steeply dipping leads 2 1/2 to 2 1/4 feet in width separated by 5 feet of rock. Two face samples are reported to contain the following iron content:

Values in per cent		
	(I)	(II)
Iron	37.07	37.9
Silica	21.32	27.0
Sulphur	0.43	-

The Dominion Iron and Steel Company carried this shaft down to a depth of 40 feet. The results were disappointing in that at the bottom there was only 3.5 feet of iron mineralization in two bands separated by about 5 feet of rock. The following analyses are given:

Face Sample		Ore Sample	
Iron	28.05%	Iron	58.54%
Silica	22.40%	Silica	5.30%

Seventy feet north of this shaft a 14-foot pit was sunk where it was found that the iron ore had decreased in thickness and quality.

Values in per cent	
Iron	35.17
Silica	19.38

Sixty feet farther north a pit showed no iron mineralization. Southward two pits 210 feet and 260 feet from the original shaft were put down, but bedrock was not reached because of surface water. Another shaft 200 feet south of the original one reached bedrock but the analyses obtained did not warrant further work.

In 1959 the area was visited and a 20-pound sample from the old dump gave the following analysis:

Values in per cent	
Iron	37.9
Silica	27.0
Phosphorus	0.17
Sulphur	0.43
Titanium dioxide	0.25

A microscopic examination of the Atkens iron ore is as follows: coarsely and finely mineralized, needle shaped, hematite (from 100 microns to several millimetres in length) closely associated with silica and some carbonates. Only about 60 to 70 per cent of total iron could be liberated at relatively coarse grinding (to about -10 mesh) and concentrated by gravity. The residual hematite is associated with silica below economical grinding (down to 30 microns).

Chisholm Prospect (30)

Lat: 45° 27' 15"
Long: 61° 40' 30"
Ref. Map: 11nbsp;F 5 East Half

This prospect is located about 500 feet downstream (east) from the mouth of Mink Brook. A 40-foot vertical shaft was sunk on the north bank of the Guysborough River around 1920. A level 40 feet in length was driven south under the river from the bottom of the shaft. The shaft was reportedly sunk on a 6-foot east-west trending vein of fairly massive specularite with minor pyrite, quartz and carbonate. A face sample was analyzed as:

Values in per cent	
Iron	30.06
Silica	18.48

A representative sample of 80 pounds collected from the "shaft" dump gave the following results:

Values in per cent		
	(I)	(II)
Iron	28.7	30.1
Silica	27.4	18.5
Phosphorus	0.16	- - -
Sulphur	2.7	- - -
Titanium dioxide	.07	- - -

Almost the entire length of the level was through a mottled light coloured rock with specularite disseminated in a coarsely crystalline ground mass of calcite and dolomite. The south end of the level had reportedly stopped when in massive specularite. The strike of the vein complex is east and the dip is steeply south.

The footwall of the vein at the shaft is a green schistose argillite with calcite veins.

The mineralogical composition and physical association of the hematite with silica in the Chisholm ore is similar to that of the Atkens prospect.

Cunningham or Dumphy Prospect (31)

Lat: 45° 27' 10"
Long: 61° 39' 00"
Ref. Map: 11nbsp;F 5 East Half

In 1902 the Dominion Iron and Steel Company carried out a thorough examination of this iron prospect at Riverside, on the south side of Milford Haven. It occurs on a brook that flows into Guysborough River.

The iron mineralization is specularite and the country rock is slate and altered limestone. On the John Dumphy property a 25-foot tunnel was driven some years ago. It is reported that 25 to 30 tons of ore, averaging 69 per cent iron, were shipped to Londonderry. The specularite is very pure without any significant amount of sulphur and silica.

A 30 pound sample of the specularite from the dump gave the following analyses:

Values in per cent		
	(I)	(II)
Iron	68.1	69.1
Silica	1.7	0.23
Phosphorus	.07	.002
Sulphur	.27	.039
Titanium dioxide	.09	- - -

References

Aletan, G. A., 1959:
Preliminary metallurgical investigation of various iron ores from Nova Scotia.

Baldwin, A. B., 1954:
Report to M. J. Boylen, Engineering Office, Bathurst, New Brunswick. Report on file at N. S. Dept. of Mines.

Brown, J. K., 1913:
Report on Roman Valley, Guysborough County.

MacNeil, D. J., 1955:
A report on occurrence of specular iron, Guysborough County, Nova Scotia.

Erinville Area

Erinville (Burns) Iron Prospect (32)

Lat: 45°23' 00"
Long: 61°43' 45"
Ref. Map: 11nbsp;F 5 East Half

The largest occurrence of iron mineralization in Guysborough County is in the vicinity of Salmon River between the villages of Erinville and Glencoe. Erinville is 15 miles southwest of the town of Guysborough.

The first reported production from this deposit was in 1882. In that year the Crane Iron Company of Philadelphia worked on the most promising outcrop which occurred on the Robert Burns farm. They sunk a shaft 50 feet deep, at the bottom of which was driven a level 25 feet through ore to the wall. Another level was driven northeast 60 feet in ore and the third level driven southeast for 35 feet. The present dump shows little rock so that the conclusion was drawn that they worked in ore. They shipped 3,000 tons of specular hematite and about 1,000 tons of rock remain on the dumps.

In the winter of 1900-01, the Dominion Iron and Steel Company unwatered the old workings, deepened the shaft and mined about 500 tons or iron ore for shipment to their smelter at Sydney. They also extensively prospected the ground to the west for around 2 miles.

Interest in the property lapsed until 1941 when the shaft was unwatered for the Dominion Steel and Coal Corporation. However, no new exploration work was carried on at that time.

In 1953 New Concord Development Corporation of Toronto drilled two holes, total footage 482.5', in the vicinity of the Old Crane shaft (11nbsp;F 5 D, Tract 11). The results were inconclusive, due chiefly to the poor core recovery.

Several partial chemical analyses are available from reports, chiefly from the work performed by the Dominion Iron and Steel Company, for 1912 to onward, on the iron mineralization on the Burns property.

Values in per cent				
No.	Iron	Silica	Phosphorus	Sulphur
1	45.28	34.84	0.17	.04
2	68.63	0.46	Tr.	.758
3	69.14	0.29	Tr.	.375
4	68.63	0.18	.002	.088
5	47.34	28.95	.006	.621
6	43.40	34.06	.006	2.[illegible]5
7	65.50	5.26	- - -	.80
8	63.24	6.92	- - -	.83
9	54.70	17.30	Tr.	.030
10	69.0	- - -	Nil.	.075

In 1959 the property was examined by the writer and a 50 pound sample collected for analysis and microscopic examination. The ore mined previously averaged: iron, 54.7 per cent, silica, 17.3 per cent and sulphur, 0.30 per cent. Microscopic examination shows laminated hematite (specularite) closely associated with silica (between the laminae) in higher grade specimens and coarsely associated in lower grade grinding (-40 mesh) and rejected by gravity separation. Coarsely associated pyrite (up to several millimetres) occurs occasionally and could not be separated by gravity concentration. Silica occurs in the form of quartz which is found in small veins running throughout the ore in all directions. The specularite occurs in beds, stringers, pockets, films and specks throughout the amygdaloidal basalt of possible lower Mississippian age.

In 1960 a departmental drill was used to investigate the economic potential of the specularite iron occurrence. Five holes, totalling 1,034 feet of drilling, investigated the area in the vicinity of the old workings (see Figure 15 for location of holes and geology). Large scale plans of the individual holes are on file with the Department of Mines, Halifax.

Figure: (Not presently available)

Figure 15. Plan view of diamond drill holes Nos. 1-5 inclusive, Erinville, Guysborough County, Nova Scotia

The drilling results indicate that the specularite occurs in association with pyrite, carbonate and quartz in an amygdaloidal and massive basaltic rock. The specularite is erratically distributed in the basalt and at no place was there sufficient width to be of economic importance. The specularite appears to be secondary and derived by alteration of pyrite.

The following table is compiled to illustrate the iron content and impurities contained in the drill cores and sludge samples from the Erinville iron deposit.

Hole No.	Sample No.	From	To	Fe	P	P_2O_5
1	1	100'	105'	11.6	.22	.50
	2	105'	115'	44.7	.26	.59
	3	115'	125'	32.9	.25	.57
	4	125'	130'	51.5	.08	.20
	5	150'	160'	48.1	.06	.15
				Fe	**S**	**P**
4	6 (sludge)	95'	115'	25.64	1.65	.08
	7	105'	112'	13.00	.99	.11
	8	140'	148'	13.20	.10	2.95
5	9 (sludge)	90'	120'	33.19	2.94	.071
	10	90'	100'	27.37	2.40	.11
	11	102'	107'	26.01	3.19	.18

References

Fletcher, H., 1886:
Report of the Geol. Surv. Canada, p. 115P.

Gilpin, E., Jr., 1891:
Trans. Can. Soc. of Civil Eng., Vol. V.

Woodman, J. E., 1908:
Summary Report, Mines Branch, p. 43.

Lindeman, E., and Bolton, L. L., 1917:
Iron ore occurrences in Canada, Mines Branch No. 217, p. 181.

Manchester Area

Manchester Iron Deposit (33)

Lat: 45° 24' 00"
Long: 61° 27' 20"
Ref. Map: 11nbsp;F 6 West Half

"The Manchester or Gullahan iron prospect is located about midway between Hadley Beach and Moose Point on the eastern side of Guysborough Harbour, Guysborough County. (Reference Map 11nbsp;F 6 C, Tract No. 15).

The main showing is approximately 250 feet north of the shore line on the farm of Mr. H. C.

Howard. The iron mineralization outcrops on the shore.

There are at least three pits. The most southerly one is a small hole, where the iron mineralization can be seen replacing a red sandstone. The strike of the vein is north 33 degrees east with an easterly dip of 80 degrees. The vein is reported to be 12 to 18 inches wide and is specularite. Approximately 170 feet north of this pit is a shaft reported to be 75 feet deep. From this shaft there are supposed to be workings extending in a southerly direction. From the relative positions of the pits, it appears that this shaft is on a parallel vein lying a short distance to the east of the vein in the south pit. Friable specularite is to be seen on the dump, some of which has been heavily slickensided.

A sample of this ore from the dump gave the following results: iron, 63.44 per cent; sulphur, trace, phosphorus, 0.56 per cent.

About 115 feet, 21 degrees magnetic from this shaft is a third pit. The strike of the vein in the pit is north 77 degrees east, magnetic, with a 75 degree easterly dip. Again it is thought that the vein is on another parallel zone. The mineralization is specularite, but definitely low grade.

The ferruginous mineralization is in rocks of lower Carboniferous (Horton) age associated with breccias and fissures developed by earth movement.

It is unlikely that there is any large body of iron mineralization. All the indications point to lenticular masses of specularite along the parallel lines of the breccias and fissures. The outcrop of one of these lenses can be seen on the Shore cliff at the point which has been specified. At this point the mineralized breccia, cemented with colloidal carbonates and minor quartz and containing vugs with terminated calcite crystals up to one inch across the long axis, may be seen. No hard hematite was observed at any place in the area".

Reference

Douglas, G. V., 1943:
Ann. Rept. of N. S. Dept. of Mines, p. 125-126.

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Annapolis County

Clementsport Basin (34)

Ref. Map: 21 A 12 East Half

The Clementsport Basin extends from a point east of Clementsport, Annapolis County, for 12 miles to the southwest and has a maximum breadth of 3 miles.

In 1825 the Annapolis Iron Mining Company was formed and Mr. Cyrus Alger, of Boston, was employed to erect a smelter. This was located at the head of tidewater on the east bank of Moose River, in the village of Clementsport. Approximately 350,000 tons of iron ore was produced during sporadic workings of the mines between that time and 1916. The ore came from two of the deposits to be described below, from one of the beds at Nictaux and in small quantities from several other places. An exceedingly good grade of charcoal iron was made from the mixed ores. Operations were suspended until about 1861. In 1862 an output of 5 tons per day was attained, but within a year or two the works were shut down. In 1872, the

Potter deposit was reopened and the furnace ran for ten weeks, using 600 tons of ore. In 1873 the furnace ran for 6 weeks during which 538 tons of ore were mined at Clementsvale and 630 smelted, the balance being largely bog ore from Bloomfield, a settlement to the southwest. In 1874 the properties passed into the hands of the New York and Nova Scotia Iron and Coal Mining Company, which, however, never seems to have done work on the iron occurrences. In 1885, 13 tons of ore are reported to have been sent to Londonderry from Annapolis, doubtless coming from Clementsport. No authentic information is available regarding the extent of the various deposits. The workings are locally known as the Potter, Milner and Milbury.

Potter Iron Prospect: (Lat: 44° 37', Long: 65° 35'). This was the first iron deposit investigated in Nova Scotia. The prospect is the easternmost of the three workings west of the highway between Clementsport and Clementsvale. The total excavation is 390 feet in length, averaging 20 feet deep. The width of the ore zone is 3' 6". Both walls are slate. No ore is now to be found, but some poor fragments are left on the dumps. The average iron content ranges between 36 to 58 per cent, with insolubles up to 23 per cent.

Milner Bed: Two surface openings are indicated. The north trench is 450 feet long and the south trench 350 feet long. Information gathered indicates that the iron ore varies in thickness from two to four feet and contains an average of 32 per cent iron and 33 per cent insolubles.

Milbury Bed: The Milbury opening is about 1.5 miles west of the Milner workings. It consists of a trench 300 feet long, striking north 70 degrees east. Three analysis are available indicating an iron content of around 60 per cent, with a silica contents of up to 15 per cent.

The information available on the three deposits indicates that they are of no commercial importance at the present time.

References

Gilpin, E., Jr., 1880:
The Mines and Mineral Lands of Nova Scotia, p. 55.

Lindeman, E., and Bolton, L. L., 1917:
Iron ore occurrences in Canada, Mines Branch, no. 217, p. 183-184. Ottawa, Can. Report No. 20, p. 38-43.

Woodman, J. E., 1907:
Iron ore deposits of Nova Scotia, Mines Branch, Ottawa, Can. Report No. 20, p. 38-43.

Nictaux-Torbrook Area (35)

Lat: 44° 55' 00"
Long: 65° 00' 00"
Ref. Map: 21 A 14 East Half

History

The existence of iron ore in the Nictaux-Torbrook Basin appears to have been known very early in the nineteenth century, and a small Catalan forge was set up at Nictaux Falls, in which a few tons of bar-iron were made. In 1825, the Annapolis Iron Mining Company was formed and they erected a large smelter on Moose River, in the village of Clementsport. Part of the ore there treated came from the western part of the Nictaux-Torbrook field, near

Nictaux River. Later a charcoal smelter was erected at Nictaux.

In 1855 an English Company mined a shell magnetite in the western part of the field, locally known as the "shell bed". Two openings were used - one close to the furnace at Nictaux Falls and the other two miles east. The operation closed down about 1863, because of too great a cost of production.

About 1870 Page and Stearns turned their attention to the magnetic ores of Cleveland Mountain on the west side of the Nictaux River. In 1890 R. E. Leckie, then manager of the Londonderry Iron and Mining Company, obtained options on certain areas in the eastern part of the district and in 1891, operations were started at the Leckie Mine. The ore was transferred to Londonderry, Colchester County. Mining operations were carried on for several years, but ceased in 1896 owing to the closing down of the iron works at Londonderry. Between 1891 to 1906, two mines, the Wheelock and the Leckie were opened at Torbrook and according to the Annual Reports of the Nova Scotia Department of Mines, a total of 348,639 tons of iron ore were produced between 1891 to 1913. Mining operations ceased, however, in August 1913, and since then, the properties have been idle.

The iron ore occurrences of the Torbrook and Nictaux area are situated in eastern Annapolis County, on the south side of the Annapolis River Valley and against the side of the highland to the south, locally called South Mountain. The iron ore zone stretches from the Kings-Messenger road to the west side of Nictaux River a distance of 8,850 feet. The ore has been obtained principally from the "Leckie" bed and a small quantity from the overlying "shell" bed. Other beds occur in this zone which have not produced any ore (Fig. 16).

Figure: (Not presently available)

Figure 16. Map of southwest part of Torbrook iron-bearing district, Annapolis County, Nova Scotia

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The "Leckie" bed had a thickness of from 4 to 9 feet at the Leckie Mine according to Woodman. On rolls it was much thicker. The iron ore in the mine is a compact red hematite, for the most part massive and without fossils. The "shell" bed is so called because it contains numerous fossils. It has an average thickness of 5 feet, however, this figure varies considerably, being up to 18 feet in places.

It is concluded that the Nictaux-Torbrook iron formation was deposited as a shallow water, oolitic textured, hematite-chamosite-siderite iron formation. The iron formations in the Torbrook area were apparently later metamorphosed by the adjacent granite and dikes and much of the iron has been changed to magnetite at the expense of hematite, siderite and silicate minerals.

General Geology

The Torbrook iron beds occur in a basin of Devonian sediments, which is approximately 9 miles in length and 3 miles in width. To the south of the Torbrook Basin a belt of slate and volcanic rocks separates the Torbrook sediments from the Devonian granites.

The iron-bearing Torbrook Formation is predominantly sedimentary in origin, metamorphosed to grey siliceous slates, phyllites and quartzites. In the region between Torbrook and the Nictaux River, beds of quartzitic iron-formation up to 10 feet thick occur on both limbs of the syncline. In places these beds are highly fossiliferous. Hematite is the most abundant iron mineral in the northeastern parts of these beds, but magnetite is the chief iron mineral in the southwestern parts where the entire section is more highly metamorphosed. The two main beds are known as the "shell" and "Leckie". The Torbrook Formation strikes north 51 degrees east, and is folded into a synclinorium pitching southwest.

Gabbro dikes and plugs intrude both the Torbrook and the Goldenville Formations. The dikes generally trend parallel to the strike of the sediments. They are gabbroic in composition, fine to medium grained, and in places have a diabasic texture.

Several types of granites are common to the area, the main type being a pink biotite granite. The intrusive granites are undoubtedly responsible for the metamorphism of the sediments, and undoubtedly had a pronounced effect on the sedimentary iron beds, supplementing the mineral change of hematite to magnetite. This is noticed especially in the western part of the field where the granites are in abundance and the iron entirely magnetite.

The main structural feature in the area is the Torbrook syncline, whose axial trace passes through the community of Torbrook and trends north 45 degrees east. The axial plane is almost vertical.

Iron-bearing Beds

Two nearly parallel iron horizons lying some 5,000 feet apart occur within the area. They are known generally as the "Northern Zone" and "South Mountain Bed" and to this might be added the "Western Beds" which consists of a number of known parallel ore beds to the west of Nictaux River, distributed in the area between the "Northern Zone" and the "South Mountain Bed". The strike is north 40 degrees east. Both south and north horizons occur intermittently along a length of 5 miles (Fig. 16).

The most recent work in the Torbrook area took place in 1956 to 1957. Following an aeromagnetic survey, Torbrook Iron Mines Limited carried out test pitting, line cutting, ground magnetometer surveys and diamond drilling.

1. Northern Zone

The northern zone extends from Black River about half a mile north of the Messenger road to the west side of Nictaux River, a distance of 8,850 feet. The ore was obtained principally from the "Leckie" bed and a small quantity from the overlying "Shell" bed. Other beds occur in this zone which have not produced any ore.

The Leckie bed had a thickness of from 4 to 9 feet at the Leckie mine, according to Woodman. On rolls it is much thicker. The iron ore in the mine is a compact red hematite for the most part massive and without fossils.

The Leckie mine, which was until 1906, the main producing bed of the Torbrook area, was opened in 1891. In the spring of 1891, two shafts, No. 2 (Woodbury) and No. 4 (Main) were opened.

The output during 1891, the first year of production, was approximately 10,000 tons. The total output until the closing of the mine in 1896 was 137,269 tons. The mine was reopened in 1903. In 1906 the last of the ore was extracted and the mine was abandoned. The ore bed had a width of about 6.5 feet at the surface, but narrowed to 4 or 5 feet at depth. The ore pinched out downward and westward, which may be due to the proximity of a stock of intrusive rock to the northwest.

The ore of the "Shell" bed consists of a fossiliferous hematite, which in many cases, has been more or less altered to magnetite, and which holds numerous fossils of Lower Devonian age. Its averaged width is about 5 feet.

Thin sections from the Shell bed show that the ore is composed of detrital quartz grains and calcareous fossil fragments with which occur spherules of green iron silicate, having a concentric structure. Crystalline magnetite has developed entirely within these spherules partially replacing the amorphous silicate. A very small amount of hematite is present. The green iron silicate resembles chamosite which is a hydrated ferrous aluminous silicate.

Analyses of Ore from Northern Zone				
Values in per cent				
	Leckie Bed	**No. of Analyses**	**Shell Bed**	**No. of Analyses**
Iron	49.20	229	44.13	81
Silica	15.09	17	16.60	81
Alumina	4.42	9	4.84	6
Lime	4.94	6	6.79	7
Magnesia	0.67	6	- - -	- -
Manganese	0.74	8	- - -	- -
Phosphorus	0.92	55	0.75	25
Sulphur	0.07	11	0.098	11

The total iron content of the beds appears to have been originally supplied principally in the form of the green iron silicate, while the sediments were in the process of formation in shallow water along a marine coast. The hematite may also have been an original constituent but the magnetite appears to be an alteration product. Since the beds are primary sediments, they are subject to variations from point to point as the character of the sedimentation changed along the coast.

2. South Mountain Bed

This bed has been traced with a magnetometer for a distance of 6,400 feet, eastward from Torbrook River. The general strike of the ore and slate is north 60 degrees east; with a dip from vertical to 80 degrees towards the northwest.

The South Mountain bed is a ferruginous quartzite composed of magnetite, green iron silicate, detrital quartz and fine-grained argillaceous material. It is frequently oolitic and at the eastern exposures contains hematite. Examined in thin sections, the green iron silicate is seen to occur in the form of spherules and also interstitially as a cement. The magnetite occurs as small masses usually with crystalline outlines and appears to be closely associated with the silicate as an alteration product. Chemical analyses of samples taken from the various test pits along the bed are listed below.

The South Mountain bed is almost entirely of low grade material and in part only ferruginous slate.

Analyses of Iron Ore from South Mountain Bed		

	Percentage	No. of Analyses
Iron	40.80	17
Insoluble Matter	24.62	12
Alumina	4.56	5
Lime	2.94	5
Magnesia	0.52	5
Phosphorus	1.56	7
Sulphur	0.016	7

3. Western Beds

These beds are in part the southwestern extension of the two horizons described above. However, west of Nictaux River, Fletcher's map shows a number of parallel beds of iron up to eleven feet across. For the most part they do not belong to the other horizons and are referred to separately as the "Western Beds". The ore runs high in manganese and silica.

Inglisville Area (36)

Lat: 44° 51' 00"
Long: 65°07' 00"
Ref. Map: 21 A 14 East Half

An anomalous zone 3,500 feet in length was outlined with the magnetometer in 1957 near Inglisville. Trenching at 300-foot intervals in the anomalous zone revealed a narrow belt of siliceous magnetite. The widest part of the bed is 5 feet.

A diamond drill hole in the eastern end of the zone intersected a few narrow bands of magnetite, the widest being 4.4 feet.

Recent Exploration Work

The most recent exploration work in the Torbrook-Nictaux basin was in 1956 to 1957. Following an aeromagnetic survey, Torbrook Iron Mines Limited did considerable test pitting, magnetometer surveys and approximately 15,090 feet of diamond drilling. This drilling verified the records of previous reports on the width, and quality of the "Shell" and "Leckie" iron beds.

Diamond drilling was done at 7 locations in the Nictaux-Torbrook basin. The iron-bearing material intersected in the drilling occurs as narrow beds in slate. There is no large, economically mineable tonnage of concentrating material indicated as the underground mining of concentrating ore in narrow beds would not be profitable.

The most extensive drilling program was done in the Canal Area which lies along the Nictaux River and the Bridgewater-Middleton branch of the Canadian National Railways. Both cross the eastern part of the ground in a northerly direction.

Geophysical investigations in the Canal Area outlined three anomalous zones. The largest, or central zone, was found to be 4,000 feet in length and two smaller zones north and south of the central zone were both approximately 1,000 feet.

Central Zone: Several drill holes intersected this zone. Seven of these gave sufficient information on the zone. The widest intersection was 10 feet, with most intersections ranging from 1.5 to 3 feet.

Northern Zone: The narrow northern zone was intersected by diamond drill hole No. 3 to verified a surface showing of a narrow band of magnetite. True width of the bed is 5 feet at 15 feet depth.

Southern Zone: The most interesting zone in the Canal Area is 800 feet south of the central zone. It is possible that this zone is a faulted portion of the western end of the central zone.

To substantiate the remarks on the iron beds in the Nictaux-Torbrook basin, the results of the diamond drilling program in the Canal Area are tabulated on the following pages.

Canal Area

					Values in per cent		
Sample	**Hole No.**	**Footage**	**Thickness**	**Iron**	**Silica**	**Sulphur**	**Phosphorus**
1	CA-1	102-104	1.0	42.98	17.52	1.86	1.96
2	"	105-109.5	2.5	24.74	23.94	Tr.	1.14
3	"	124-142	2.0	33.26	39.76	0.26	1.17
4	"	150-155	1.4	25.62	42.96	0.12	0.57
6	"	183.5-187.5	1.0	21.52	44.79	0.08	0.87
7	"	187.5-214.5	7.0	26.94	42.69	0.07	0.91
8	"	261-275	4.8	43.78	24.54	0.05	0.08
9	"	305-310	1.9	32.48	32.72	0.17	0.87
10	CA-2	155.5-163	5.2	46.75	19.44	0.07	1.44
11	"	163-167	2.7	15.88	51.28	0.08	0.60
12	"	180-185.5	3.3	24.95	47.30	0.49	1.21
13	CA-3	7-15	4.8	45.02	22.86	0.05	1.75
14	"	409.5-417.5	1.0	38.82	28.16	0.33	0.82
15	"	25-52	2.0	46.25	20.10	0.18	1.44
17	"	173.6-197.5	2.0	47.28	18.70	0.04	1.48
18	"	215-225	1.0	27.40	40.24	0.54	0.57
19	"	238.5-250	1.5	36.68	28.28	0.12	0.85
20	"	464.9-479	1.0	32.55	39.60	0.14	0.76
21	"	576.5-572	1.0	35.39	35.66	Tr.	1.44
23	"	618-633.5	2.0	20.99	47.24	0.11	0.81
24	CA-8	90-150	6.0	36.46	36.19	.007	1.13

25	"	191-204	2.0	34.98	35.62	0.03	0.95
26	"	248.5-251.5	1.0	33.57	34.04	0.06	1.27
28	"	320-335	1.0	16.77	57.74	0.07	0.68
29	CA-8	340-350	1.0	26.89	41.10	0.08	0.77
30	CA-9	174.8-181-1	3.0	32.72	34.46	0.05	0.74
31	"	198.7-206	3.0	32.72	32.66	0.13	0.89
32	CA-11	83.3-90	2.0	40.72	28.26	0.15	1.47
33	"	107.7-115.5	2.0	24.42	43.60	0.12	0.88
35	"	120-132	3.0	27.48	41.68	0.12	0.98
36	"	48-54.9	4.0	31.64	37.74	0.17	0.82
37	"	100-107.5	5.0	25.18	40.22	1.09	1.05

The average grade of the 32 samples taken from drill holes in the Canal area is as follows:

% Iron	% Silica	% Sulphur	% Phosphorus
33.12	34.12	0.19	1.01

Investigations on Torbrook Ores

In 1959 a program was initiated to examine a number of the major iron deposits in Nova Scotia to determine the mineralogical composition of the various ores, particularly with regard to possible utilization of these ores by the recently developed "direct reduction" process. A brief account of the microscopic examination to determine the mineralogical composition of the ores in the Nictaux-Torbrook areas is outlined below:

"Torbrook Ore" (Wheelock shaft)

Finely mineralized magnetite (30-50 microns) cemented by silica (of 30-500 microns) most of which is free of any iron minerals. However, particularly the finely mineralized silica grains contain accumulation of very fine hematite (of 0.1-1-5 -10 microns) which would not permit a separation by gravity. Grinding to about 200 mesh and separation of free and contaminated hematitic silica by magnetic forces will be feasible and could substantially increase the iron content in a process of beneficiation of this ore. However, this will cause a loss of iron of about 10 to 20 percent. Phosphorus present as calcium-phosphate and coarsely associated (50-100-500 microns) with silica could be substantially eliminated by magnetic separation.

"Torbrook Ore" Canal Area

As in "Wheelock Shaft" ore finely mineralized; magnetite associated with coarsely mineralized silica, which is usually free of any iron minerals and could be separated, during a magnetic concentration of magnetite at grinding to about -48 mesh. Phosphorus, mostly associated as calcium-phosphate grains of 30-50-100-250 microns with silica, could be substantially eliminated in the course of magnetic concentration of the ore.

"Torbrook Ore" Shell Vein

Magnetite as chief iron mineral and coarsely associated with silica. Could be separated and concentrated electromagnetically at grinding to about 48 mesh. However, as most of the silica grains are contaminated by hematite, a substantial loss of iron could be expected during such beneficiation. Phosphorus present as calcium-phosphate could be probably substantially reduced in the produced iron concentrate.

"Torbrook Ore" Martin Shaft Leckie Vein

Coarsely mineralized magnetite in process of alteration to hematite which amounts to about 30 per cent of total iron. Silica, although partially coarsely mineralized is usually contaminated by hematite. Magnetic concentration of this ore, with the emphasis to eliminate phosphorus will be only possible after reducing roasting and conversion of hematite to magnetite; otherwise the loss of iron during the magnetic beneficiation procedure would be prohibitive.

Analytical Results of Torbrook-Nictaux Iron Ore - Samples Collected in 1959

	Values in per cent				
	Iron	**Silica**	**Titania**	**Sulphur**	**Phosphorus**
Torbrook Ore Wheelock Shaft	47.1	6.38	0.33	Nil	1.15
Torbrook Ore Martin Shaft	52.8	10.6	0.42	Nil	1.32
Torbrook Ore Shell Vein	46.3	11.8	0.30	Nil	1.13
Torbrook Ore Canal Area (Drill core collected by writer)	40.0	26.9	0.31	0.28	1.43

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Pictou County

General

Although the existence of iron ores on East River of Pictou was known for many years, it was not until 1872 that any systematic attempts were made to test their extent. As early as 1828, or shortly after the General Mining Association of London opened their Pictou

Collieries, a blast furnace was erected at the Colliery, and a small quantity of red hematite and limonite smelted; but the expenses of hauling the ore twelve miles soon put an end to the work. Nothing was then done until, in 1872-73, extensive explorations were carried on under the supervision of Dr. William Dawson.

In 1891 the Pictou Charcoal and Iron Company leased the rights to mine iron ore on the Grant property and erected a blast furnace on the property to produce a charcoal pig iron. Limestone was obtained from a quarry at Springville, three miles distance.

In 1898 the Pictou Charcoal and Iron Company leased their furnace to the Mineral Production Company of New York for the purpose of making ferromanganese. The iron ore was obtained from the Pictou Charcoal and Iron Company and the manganese in the form of briquettes obtained from a bog deposit at Dawson settlement, Albert County, New Brunswick. These operations ceased about the end of 1899.

The Nova Scotia Steel Company mined ore from the property adjoining the Pictou Charcoal and Iron Company for the same period of years and the surplus ore produced by the Pictou Charcoal and Iron Company was purchased for their blast furnace at Ferrona.

In 1903 the Bridgeville Mining Company started a new shaft and shipped some 3,000 tons of iron ore to the Nova Scotia Company. It is apparent that during the period of activity in the Bridgeville district, a high grade of pig iron was produced by the Pictou Charcoal and Iron Company and by the Nova Scotia Steel Company at Ferrona form ores purchased from the Bridgeville Company.

The iron ore at East River was a black to light brown limonite with a botryoidal or radiating texture and often goethite. The limonite in all the deposits contained more or less manganese, varying from a fraction of one per cent to several per cent within the same deposit.

The deposits along the East River occur on the contact of Ordovician and Silurian rocks and Carboniferous (Windsor Group) limestone. Numerous occurrences of hematite have been located in the hills to the north associated with the Ordovician and Silurian rocks, but none of these deposits proved to be of economic value due to the low content of iron and excessive amount of silica.

It is possible that other small deposits of limonitic iron ore occur along the contact of the Carboniferous limestone with the older rocks, but they would have no economic importance at the present time.

Geology

The hills to the northeast of East River are underlain by grey shales, grey to brownish sandy shales and blackish slates of Ordovician and Silurian age. Bodies of diabase, some of considerable extent intrude rock of both groups. In addition, small bodies and dikes of andesitic composition intrude the Ordovician rocks and small stringers of ankerite were observed in them.

Overlying these rocks unconformably and occupying the low valley of the East River are limestones of the marine Windsor Group. The limestones are mainly massive and buff coloured but locally they are bedded and light to dark grey. The contact of the limestone with the older rocks is exposed in a quarry near Springville, and is an angular unconformity dipping 38 degrees to the west. In this quarry the limestone shows no bedding and contains fragments of the underlying slate. At the west end of the quarry, it is slightly ferruginous as is indicated by a limonite coating on weathered surfaces.

The iron ores of the district were found at or near the contact of the limestones and the older rocks.

Most references to the district term the ore limonite, and only botryoidal forms of hydrous iron oxide were found on the dumps. Manganese is present in the iron in small amounts. Other minerals mentioned are hematite, specular hematite, siderite, ankerite and psilomelane.

From all sources of information, it would seem likely that the iron deposits were laid down on a pre-Carboniferous land surface. If the ore deposits were formed by weathering, solution and deposition processes took place on the present land surface much of the ore would have been formed along the contact between the two major rock groups. It is hard to imagine that the limonite would be deposited in the shales and slates to the exclusion of the nearby, easily replaced limestone. In none of the dumps examined were any fragments of limonite found adhering to limestone.

It is to be expected that the ore bodies will be in pockets and consequently, that no continuity from one iron body to another can be anticipated. It is possible that small ore bodies and concentrations will exist at several places along the contact but they would be uneconomic by modern standards.

East River of Pictou Area (37)

Lat: 45° 27' 00
Long: 62° 36' 00"
Ref. Map: 11nbsp;E 7 East Half

Ten iron occurrences are recorded in the Bridgeville-Sunnybrae area (Fig. 17 and Fig. 18). Only a brief account of the various prospects will be given below.

Figure: (Not presently available)
Figure 17. Surface plan of Bridgeville iron district, Pictou County, Nova Scotia

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Figure: (Not presently available)
Figure 18. Bridgeville iron district, Pictou County, Nova Scotia, showing geology

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Fraser Prospect

This deposit is located one mile east of Bridgeville on the north side of the highway, in Tract 54, Claim P. It is reported that the Nova Scotia Steel Company mined 10,000 tons of iron ore from this deposit.

Cameron Mine

This deposit is north of Bridgeville. It is reported that the iron ore occupied a shallow basin in slate with a hanging wall of limestone. The deposit was worked to a depth of 200 feet on the dip and yielded 10,000 tons of ore. The iron occurrence is located on Claim G, Tract 54.

The main body of the ore was low in manganese. Three samples of the dump material gave the following results:

Values in per cent			
	(I)	(II)	(III)
Iron	50.79	46.02	27.92
Silica	17.10	9.02	2.31
Manganese	0.54	0.46	31.80
Phosphorus	0.074	0.032	0.062
Sulphur	0.028	0.023	0.002

J. S. Cameron Mine

The J. S. Cameron mine is a typical contact deposit of the region. From the surface down to a depth of 300 feet along the incline, the limestone was replaced by a high grade limonite, averaging over 10 feet in thickness. Below the 300-foot level, the orebody began to decrease in thickness and within 75 feet pinched out. The total iron ore produced from this deposit is reported to be between 40,000 to 50,000 tons. The prospect was located in Tract 54, Claim G.

Grant Mines

The first operations on this property were performed by an open-cut about 1,000 feet long and carried up the hill. To recover the ore beneath this open-cut a tunnel was driven into the hill a distance of 300 feet from which ore was removed and later several tunnels were started at a lower elevation.

Three deposits are included in the Grant Mines known as Scotia Grant, Middle Grant and Big Grant Mines. The Scotia Grant prospect produced 10,000 tons. The Middle Grant mine was worked by two adits, the levels in ore totalling several hundred feet. The thickness was 18 feet at the top but decreased downwards. The Big Grant mine has a thickness of 30 feet of ore in places.

The grade of the ore varied greatly within short distances and uniform grade was difficult to obtain. The ores mined from these properties consisted of hematite, limonite and manganous limonite or as they were known locally, red ore, brown ore and manganese ore. The following analyses are available of the ore from the Grant Mines:

Values in per cent		
	(I)	(II)
Iron	56.57	52.92
Silica	5.58	8.81
Phosphorus	0.213	0.19
Sulphur	0.96	0.069
Manganese	- - -	4.43

A total of 58,256 tons were mined and over 4,000 tons smelted on the property; the remainder being sold to customers.

McDonald Mine

The ore from the workings on the McDonald farm, to the west of the Grant farm, yielded approximately 40,000 tons from a slope driven for 400 feet. The ore had to be washed to remove the clay. The crude ore as sent to the washing plant carried 51.63 per cent iron and 9.38 per cent silica. The washed ore carried 58.41 per cent iron, 6.5 per cent silica and 1.88 per cent manganese.

The McDonald mine was one of the largest in this area and yielded approximately 40,000 tons. Its depth down the main slope was over 400 feet and the orebody had a thickness of 25 feet in places.

Saddler Deposit

The Saddler mine is located about 2,000 feet east of the Big Grant mine. The deposit was worked by two vertical shafts 32 feet and 180 feet deep, respectively, with crosscuts made into the ore. The total output of this mine is reported to have been 10,000 tons. Around 1830 ore was mined here by the General Mining Association, and in 1886 some ore was shipped to the Londonderry furnace. The Nova Scotia Steel Company worked the mine on royalty.

Black Diamond Mine

The Black Diamond Mine lies southeast of and near the Cameron Mine. The deposit was reported to lie in a deep depression within Silurian slate. The workings were between 800 to 900 feet in length, the width being 20 feet and the depth between 30 to 40 feet. The amount of iron ore extracted was approximately 10,000 tons. The prospect was located in Tract 54, Claim H.

Black Rock Mine

The Black Rock Mine is the last operation going eastward towards Sunnybrae. The upper part of the deposit which was reported to be good grade was worked by open-cut while the lower portion, which was worked from an adit was low grade.

Drilling Data at Bridgeville

During 1941 to 1942 prospecting was carried on using a hand churn drill two miles west of Bridgeville, in Tract 45. No iron or manganese ore was discovered.

In November, 1942, a drill hole was put down on Tract 53, on the Grant property to a depth of 36 feet. No ore was encountered in the hole.

In 1943 two diamond drill holes were put down on Tract 45, 2 miles east of Bridgeville. Hole No. 1 passed through 52 feet of clay. Hole No. 2, after penetrating 40 feet of clay, intersected 44.5 feet of breccia and sandstone. A drill hole was put down to a depth of 39.5 feet on the Fraser prospect, Tract 54, Claim K, however, bedrock was not reached and the hole was abandoned. No evidence of iron or manganese ore was found in the drilling in 1943.

In 1955 three vertical holes were drilled in the Bridgeville area. Borehole No. 1 was drilled 643 feet on the south side of the Bridgeville-Sunnybrae highway on the boundary line between Claim A, Tract 54 to Claim D, Tract 53. No. 2 hole was drilled near the south central part of Claim H, Tract 54 to was 402 feet deep. Hole No. 3 was drilled back of the old smelter location near the boundary between Claims F and C, Tract 53 to was drilled to a depth of 420 feet.

Practically all the core was shale with some sections seeming, by their weight, to be either ferruginous or manganiferous. However, none of the core showed any massive mineralization that would warrant investigation.

References

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Piper Lake Area

Piper Lake Siderite (38)

Lat: 45° 20' 45"
Long: 62° 40'
Ref. Map: 11nbsp;E 7 East Half

During construction of the highway from the village of Lorne to Trafalgar around 1913, a vein of siderite was discovered near the northwest corner of Piper Lake. Piper Lake is located 16 miles south of New Glasgow and 6 miles from the village of Lorne.

The rocks in the Piper Lake area belong to the Horton Group of lower, Mississippian age. At the deposit, they consist of quartzite, shale and slate, striking north 70 degrees east and dipping between 60 to 85 degrees west. The rock bordering the carbonate vein is highly brecciated in places and the interspaces filled with siderite and small quartz veins carrying minor pyrite and chalcopyrite.

The siderite vein varies in width from 2 to 8 feet and occurs in a clean cut fracture cutting diagonally across the beds of quartzite and slate. It strikes north 30 degrees west and is dipping 80 degrees west. The siderite vein was traced for 275 feet by eleven trenches and several pits. The area at the south end of Piper Lake is low and swampy so it was impossible to extend it in that direction by trenching.

In 1949 Ironlake Exploration Limited, directed a borehole to investigate the area under Piper Lake, and away from the known carbonate dike (see Record No. 1588, N.S.D.M., 1949, p. 128).

Analyses of Piper Lake Siderite

Values in per cent

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)	(XI)
Iron	40.83	41.00	40.65	40.30	40.83	39.13	39.8	40.83	41.00	40.65	57.93
Silica	0.40	0.76	0.20	0.40	4.08	4.01	2.43	4.08	.16	.20	.60
Lime	.52	.36	.72	.80	.40	.62	- - -	0.40	.36	.72	.80
Magnesia	4.43	5.08	4.57	5.10	1.13	3.60	- - -	1.13	5.08	4.57	9.20
Manganese	2.44	2.22	2.78	2.89	3.55	2.96	- - -	3.55	2.22	2.78	6.32
Phosphorus	- - -	- - -	- - -	- - -	- - -	0.66	0.16	- - -	- - -	- - -	.03
Sulphur	- - -	- - -	- - -	- - -	- - -	0.49	Tr.	- - -	- - -	- - -	Tr.

A microscopic study, in 1959, shows the major portion of the siderite to be in large well developed crystals and free from contamination. The property was investigated years ago as the siderite is coarse grained and especially suitable as basic iron-bearing flux for mixing with siliceous ores in a fire metallurgical operation.

The analyses available (Analyses) indicate the siderite carries a small amount of silica, phosphorus and sulphur but is high in manganese and magnesia. The average iron content is 40 per cent.

Nova Scotia Department of Mines (1949)

Record No. 1588

Borehole No. 1 is located at the northwest end of Piper Lake on the east side of the road to Trafalgar and is drilled at an angle of 50° on a bearing S 73 degrees E for 173 feet.

Strata	Thickness, Ft.	Depth Feet
Overburden	14.0	14.0
Quartzite, grey	74.0	88.0
Slate, blue	3.0	91.0
Quartzite, grey, some slate belts	56.1	147.1
Quartzite, bands of siderite	1.7	148.8
Slate and siderite banded	4.2	153.0
Siderite, red crystalline	1.0	154.0
Slate, blue	0.4	154.4
Siderite, reddish	3.2	157.6
Slate, blue	0.8	158.4
Siderite, red	0.5	158.9

Quartzite, grey, very hard	14.1	173.0

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Siderite at Piper Lake, N. S. Dept. of Mines (on file)

Drug Brook Siderite Deposit (39)

Lat: 45° 24' 10"
Long: 62° 40' 20"
Ref. Map: 11nbsp;E 7 East Half

The deposit is located 13 miles south of New Glasgow, and below the Junction of Cross Brook with the West Branch of the East River of Pictou. This location is about three miles north of Piper Lake.

The siderite vein occurs in a fault traversing black slates and shales of the Horton Group of lower Mississippian age. Near the vein in the bed of the brook small veins and stringers of siderite occur paralleling the main vein up to 100 feet distant. The vein is partly exposed in the bed of the brook and in trenches on the north and south banks. The width of 11 to 12 feet is exclusive of some mixed wall rock and siderite on the east wall. Small amounts of pyrite and chalcopyrite occur in places in the vein mostly near the walls. A sample of unweathered siderite was taken from three openings and the analysis is as follows:

Values in per cent	
Silica	1.37
Iron	35.87
Alumina	18.98
Lime	0.58
Magnesia	6.36
Manganese oxide	3.35
Sulphur	0.13

References

Goodwin W. M., 1928:

Piper Lake Siderite prospect, N. S. Dept. of Mines, also refer to Drug Brook property.

Messervey, J. P., 1928:
Siderite at Drug Brook, N. S. Dept. of Mines (on file)

Other Analyses of Drug Brook Siderite

Values in per cent

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)
Silica	0.40	4.08	11.40	6.00	12.60	6.11	16.67	8.91	0.45
Iron	40.83	40.83	33.96	40.30	35.02	61.13	49.66	59.87	62.97
Lime	0.52	0.40	0.48	0.08	0.80	0.60	0.70	1.01	1.28
Magnesia	4.43	1.13	4.34	0.98	.134	1.69	6.35	1.46	8.68
Manganese	2.44	3.55	4.22	3.34	3.05	5.32	6.17	4.96	3.53
L. O. I.	36.24	33.20	31.60	32.68	30.00	- - -	- - -	- - -	- - -

Summary of Siderite Occurrences

The siderite occurrences are located in southeastern Pictou County and have been known for several years. Development work at Piper Lake consisted of eleven trenches along a strike length of 275 feet. Coarse crystalline siderite, relatively free from other minerals, in the form of a vein, varies in width from 2 to 8 feet. The average tenor of iron from all available analyses is approximately 40 per cent with less than 2 per cent silica and a trace of sulphur and phosphorus. The deposit lies in a fault cutting diagonally the regional trend of formations. It is possible that other lenses of siderite occur along this major fracture.

The siderite deposit known as the Drug Brook showing is 3 miles north of Piper Lake and is strikingly similar to that at Piper Lake. It is 11 feet in width and confined to a strong fracture zone. The wallrock along the fracture is shattered up to 100 feet from the vein and filled with small veins and stringers of siderite. Small amounts of pyrite and chalcopyrite occur in places in the vein, mostly near the walls. The analyses available indicate an average iron content of 35.87 per cent, silica 1.37 per cent with traces of sulphur and phosphorus.

It is evident that the siderite deposits are too small to be considered as a source of iron ore. They are lenticular and would not supply more than 10 to 15 thousand tons per 100 feet of vertical depth.

Other Iron Occurrences

Piedmont Iron Occurrence (40)

Lat: 45° 36' 00"
Long: 62° 21' 00"
Ref. Map: 11nbsp;E 9 West Half

This iron deposit is located on the northern slope of the range of hills south of the village of Piedmont and a mile southwest of Piedmont Station on the Canadian National Railways, Pictou County. It lies at an elevation of 600 feet above sea level and can be reached by a secondary road leading southward from near Piedmont Station.

The ferruginous bed was discovered late in 1915. In 1916 several open-cuts were made and an examination was made of the showing by Dr. A. O. Hayes for the Geological Survey of Canada. The area was visited in 1960 by the writer and the rocks exposed along Hogan Brook and westward were examined. The trenches along the ferruginous bed are now covered with debris so it is necessary to use data from previous workers on details of the geology and characteristics of the iron mineralization.

The rocks in the range of hills south of Piedmont are of Ordovician age. They consist of conglomerate, sandstone and shale intruded by dikes of acid and intermediate composition rocks.

Sections exposed in stream valleys on both north and south slopes of the ridge show that the Ordovician sediments lie in a synclinal fold with axis in an east-west direction. Igneous intrusions occur in a large dike-like form and apparently form the core of the hills. Other dikes and volcanic rocks outcrop on the summit and northern slope. On the north slope a thickness of several hundred feet of reddish brown coloured conglomerates occur. These are overlain by fine-grained green slates and sheared sandstones in which the oolitic hematite occurs. On the south slope, coarse sandstones are overlain by slate and sandstone of similar character to those outcropping on the north slope of the hill.

"The accompanying plan (Fig. 19) illustrates the structure in the vicinity of the deposit. The strike of the beds near the northerly fault is east and the dip is 37 degrees south. Westward between the two faults the sediments are crumpled in a sharp fold pitching steeply to the south. Fifty feet westward, the strata strike northeast and dip 59 degrees southeast, while at the faulted contact with the volcanic rock the sediments strike south and dip 48 degrees east. Drag is well developed in the sediments at both faults and shows that the east side has moved southward relative to the west side. The amount of throw on the west fault is unknown. The east fault ends in the massive ferruginous bed and appears to form a break along a sharp crumple of the strata. The eastern limb is flexed sharply southwards, and a clean slickensided fault face shows that there was a definite throw of the east limb southward.

Figure: (Not presently available)
Figure 19. Iron ore bed at Piedmont, Pictou County, Nova Scotia.

The dike which forms the hanging wall of the iron bed is apparently conformable with the latter. The dike is shattered along the fault. The volcanic rock to the west is not similar to the dike overlying the ore but appears to be an amygdaloidal.

The ferruginous bed is composed of detrital quartz grains in a matrix of green iron silicate and hematite. These iron-bearing minerals occur largely in the form of spherules usually built around a quartz grain as a nucleus. They also occur in masses with no definite structure. Hexagonal plates of hematite occur in the green iron silicate and represent various stages of crystal growth. It is probable that both silicate and oxide are of sedimentary origin but that the silicate formed fist, and the hematite developed later by oxidation, in the unconsolidated sediments.

The iron content of the bed at Piedmont is somewhat lean on account of the presence of detrital quartz together with a relatively high percentage of the silicate of iron. It is characteristic of these deposits to vary in character both along the strike and dip, for they are sedimentary deposits laid down in shallow offshore marine waters.

A 7-foot sample of the ferruginous bed assayed as follows: iron (total), 42.00 per cent; silica, 21.24 per cent; phosphorus, 0.704 per cent and lime, 6.46 per cent".

References

Hayes, A. O., 1916:
Investigations in New Brunswick and Nova Scotia, Ann. Rept., Geol. Surv. Canada, p. 275-277.

Gross, G. A., 1967:
Geology of iron deposits in Canada, Economic Geology Rept. No. 22, Department of Energy, Mines and Resources, p. 18.

Webster Iron Occurrence (41)

Lat: 45° 29' 04"
Long: 62° 31' 30"
Ref. Map: 11nbsp;E 7 East Half

The Webster iron occurrence is located on South McLellans Mountain and about 1,300 feet west of the highway leading to MacPherson Lake. It is west of the Sutherland River. The wallrock in the trench is greenish coloured quartzite of Silurian age. The iron bed is reddish in colour with a mixture of hematite and rounded grains of quartz. The width of the mineralization at this trench is 8 feet, striking north 70 degrees east and with a steep dip to the northwest. The following is an analysis:

	Values in per cent
Iron	54.36
Silica	19.43
Alumina	0.45
Lime	2.44
Magnesia	0.98
Manganese	0.52
Sulphur	0.29
Phosphorus	0.22

Three samples taken at various points gave 23.8, 26.6 to 28.1 per cent metallic iron. Only one trench exposed the iron mineralization in 1959, and it is judged that an average of 20 per cent iron is reasonable. The ferruginous beds are described as siliceous with iron impregnated grit, the thinner beds being oolitic hematite and richer in iron.

References

Selwyn, A. R. C., 1886:
Economic Minerals of Canada, Pictou County, Nova Scotia.

Meiklefield Hematite Bed (42)

Lat: 45 32' 00"

Long: 62° 28' 00"
Ref. Map: 11nbsp;E 9 West Half

West of Sutherland River is a narrow bed of red oolitic hematite in sediments. The bed strikes east, has a vertical dip, and varies from 2 to 5 feet, averaging 4 feet.

An 80-foot deep shaft was sunk on the deposit. The vein was 4 feet wide on the surface but pinched out at the bottom of the shaft. A sample across the bed gave the following analysis:

	Values in per cent
Iron	45.56
Silica	3.76
Phosphorus	0.13

Telford or McLaurin Carbonate Bed (43)

Lat: 45° 34' 18"
Long: 62° 28' 30"
Ref. Map: 11nbsp;E 9 West Half

According to Hugh Fletcher, (1890, G.S.C., p. 175P), the siderite bed is associated with greenish grey grit, reddish flinty grit and sandstone, perhaps along a fault zone. It contains pebbles of syenite and felsite and others of flinty grit.

The only authentic information on the siderite deposit at Telford is obtained from the two drill holes put down in 1949 by Ironlake Exploration Company Limited.

Record No. 1530

Borehole No. 1 is located 100 feet north of the Old Mountain shaft and drilled south at an angle of 55 degrees for 180 feet. Located on Claim B, Tract 62.

Strata	Thickness, Ft.	Depth, Ft.
Overburden	25.0	25.0
Gypsum, white	25.0	50.0
Limestone conglomerate, red	25.0	75.0
Shale, red	21.0	96.0
Limestone grit, red	52.0	148.0
Limestone reddish	9.5	157.5
Calcareous shale, greenish	1.0	158.5
Siderite, reddish, grey	1.7	160.2
Shale, red to dark green	19.8	180.0

Record No. 1531

Borehole No. 2 is located 140 feet south of boreHole 1, and is drilled to the northeast at an angle of 55 degrees for 199 feet.

Strata	Thickness, Ft.	Depth, Ft.
Overburden	17.0	17.0
Shale, red	20.0	37.0
Limestone, reddish	138.0	175.0
Gypsum, grey	24.0	199.0

References

1949:
Ann. Rept. of N. S. Dept. of Mines

Fall Brook (Holmes Watson Mine) (44)

Lat: 45° 31' 48"
Long: 62° 31' 40"
Ref. Map: 11nbsp;E 10 East Half

This occurrence is found in quartzite which is probably a portion of the McAdam Formation of Silurian age. The deposit consists of a bed of oolitic hematite varying from 2 to 5 feet in width trending easterly. The occurrence is similar to that examined at Arisaig, Antigonish County.

The iron content of the bed would be less than 40 per cent.

There are several other beds of grit or sandstone impregnated with red hematite in the vicinity of South McLellan Mountain associated with the Ordovician and Silurian rocks. As far as known, their low iron content renders them of no economic significance at the present time. Along the west side of Sutherland River and two miles south of Sutherlands Mills are two exposures of the same type of iron occurrence as noted at the Holmes-Watson occurrence. The Wentworth 18-foot bed of hematite assayed only 31 per cent iron.

Occurrence of hematite are reported near Blanchard Brook and westward to Iron Ore village on the Glencoe road. A trench near the village exposes on ore bed 4 feet thick carrying 41.5 per cent iron.

Reference

Lindeman, E., 1917:
Iron ore occurrences in Canada, Mines Branch, No. 217, 1917, p. 175.

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Hants County

At several places throughout Hants County are found occurrences of iron ore, especially limonite with minor amounts of hematite, in rock of Carboniferous age. They occur in sandstone of the Cheverie Formation and in brecciated limestone of the Macumber formation. A small production was achieved in the early 1900's, but the deposits were of limited extent, both on surface and in depth. Brief mention will be given of the various deposits in Hants County.

Lantz Prospect (45)

Lat: 45° 10' 20"
Long: 64° 04' 05"
Ref. Map: 21nbsp;H 1 East Half

The Lantz prospect is one mile east of the Goshen road and four miles south-east of Cambridge. The Lantz openings show a few old pits with no ore on the surface, but Smitheringale states that early reports mention fine specimens of pyrolusite were obtained from the old workings. Some siderite is associated with the manganese.

Goshen Prospect (46)

Lat: 45° 09' 50"
Long: 64° 04' 40"
Ref. Map: 21nbsp;H 1 East Half

The Goshen prospect is one mile southwest of the Lantz prospect. The old pits and shafts were blasted and sunk into a brecciated zone containing limonite, manganese oxides and barite. The beds in this area are partly in Cheverie sandstone and partly in what appears to be the Macumber limestone replaced by siderite. In places this zone also contains a barite-limonite gossan, derived from a primary siderite-barite assemblage.

The exploration work was done in 1885, and the area was visited by Woodman in 1907. At this time nothing could be seen except a pit and an old dump, exposing bothryoidal limonite heavy in manganese. Analyses from the workings on this property show iron 34 to 50 per cent, silica 4 to 17 per cent, phosphorus .03 to 0.09 per cent and sulphur .08 per cent.

In 1961, Consolidated Mining and Smelting Company bulldozed the mineralized zone down to fresh bedrock. The excavation exposed considerable siderite with some barite and a little disseminated pyrite.

Tomlinson Prospect (47)

Lat: 45° 10' 47"
Long: 64° 03' 00"
Ref. Map: 21nbsp;H 1 East Half

The Tomlinson prospect is somewhat more than 2 miles west of Walton and about 3 miles south of Pembroke, Hants County.

The workings consisting of a few trenches and a shaft are in ferruginous sandstone of the Cheverie Formation (Mississippian) which on weathering has yielded a surface product of siliceous limonite. The shaft is reported to be 25 feet deep which in the northwest side showed mashed rock, probably a fault zone.

On the dump are some pieces of siliceous limonite, a little hematite and a few pieces of pyrolusite.

The limonite-hematite deposits probably owe their origin to circulating ground-water and were derived from oxidation of siderite. The production zone has been reported to be 6 to 8 feet wide. A sample taken from one of the dumps gave: iron 37.9 per cent and manganese 1.35 per cent.

References

Boyle, R. W., 1963:
Geology of the barite, gypsum, manganese and lead-zinc-cooper-silver deposits of the Walton-Cheverie area, Nova Scotia; Geol. Surv. of Canada, Paper 62-25, p. 19-20.

Hanson, G., 1932:
Manganese deposits of Canada, Geol. Surv. Canada, Econ. Geol. Ser., No. 12.

Ingall, E. D., 1903:
Manganese, Nova Scotia; Geol. Surv. Canada, Ann. Rept. 15, pt. 3, p. 155-156.

Lindeman, E. and Bolton, L. L., 1917:
Iron ore occurrences in Canada, Mines Branch, Vol. 2, No. 217, p. 182-183.

Selma Iron Deposit (48)

Lat: 45° 19' 02"
Long: 63° 31' 47"
Ref. Map: 11nbsp;E 5 East Half

The Selma mine is located west of the mouth of the Shubenacadie River one and one-half miles west of the village of Maitland. The iron occurrence is about 1/2 mile southwest of the church at Selma.

The deposit was examined by Woodman in 1906. He reports that, "the New Glasgow Iron, Coal and Railway Company, predecessor of the Nova Scotia Steel and Coal Company sank one of the pits and found ore across a width of 8 feet at the bottom". He quotes several analyses made by that company, the average being:

- iron 44.0 per cent,
- silica 10.0 per cent,
- phosphorus .05 per cent
- and very low in sulphur.

He states that the ore was part limonite and part hematite, with more of the former than of the latter. Subsequently several shallow openings were made to the west, but only mixed ore and rock were found.

The deposit is in rocks of the Horton Group very close to their contact with the overlying Windsor rocks. This zone has been proven particularly susceptible to supergene replacements by various minerals. As no future work was done, it is likely that the mineralization proved to be of small extent.

References

Lindeman, E., and Bolton, L. L., 1917:
Iron Ore occurrences in Canada, Mines Branch, Ottawa, Vol. 2, No. 217, p. 182-183.

Weeks, L. J., 1948:
Londonderry and Bass River map-areas, Colchester and Hants Counties; Geol. Surv. Canada, Mem. 245, p. 62-63.

Woodman, J. E., 1909:
Iron ore deposits of Nova Scotia, Mines Branch, Ottawa, Rept. No. 20, p. 136.

Iron Ore Deposits at Shubenacadie (49)

Lat: 44° 57' 16"
Long: 63° 35' 55"
Ref. Map: 11nbsp;D 13 East Half

Grand Lake, Hants County

This deposit is located in Hants County, north of the boundary between that county and Halifax County, about 3 miles northwest from Enfield. The deposit lies near the west side of Grand Lake, near Annand Brook (see Elmsdale Sheet No. 66 to Map No. 1005, Geol. Surv. Canada, for location).

In 1911, Mr. John Midgley examined the property for the Dominion Iron and Steel Company, but his report was not favourable and no further work has been done in that area.

The iron deposits occur at the contact of the Gold-bearing Meguma Group of Ordovician age and rocks of the Windsor Group (Mississippian).

Along the bed and west bank of Annand Brook there are several indications of hematite. The first is at a tunnel which has been driven 40 feet into the side of the hill. At the entrance of the tunnel there is a flat-lying bed of hematite about 9 inches thick lying on the upturned edges of the slate horizon. At the face of the tunnel the thickness of the bed decreases to 2 inches.

About 75 yards upstream, another tunnel twelve feet in length showed the red hematite. Between the two points indications of iron ore may be seen in the brook but it is very irregular and shows some faulting. It appears that other small deposits may be found in the district, but evidence points to the improbability of finding a commercial body of iron ore.

The only analysis available is given below:

	Values in per cent
Iron	44.22
Silica	9.36
Phosphorus	3.96
Sulphur	0.096
Magnesia	10.84

Reference

Midgley, J., 1911:
Report on iron ore deposit near west side of Grand Lake, Hants County. Report to

Dominion Iron and Steel Company, Sydney, Nova Scotia.

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Kings County

Somerset Magnetite (50)

Lat: 45° 06' 45" (approximate)
Long: 64° 45' 00"
Ref. Map: 21nbsp;H 2 West Half

About 2 1/2 miles north of Somerset post office, an occurrence of magnetite is recorded in the Triassic basalt associated with quartz. To date such deposits have not been found to be of large extent. The magnetite vein or lens is from 7 to 10 inches thick, and the iron content is said to be 61 per cent. A magnetometer survey was made to determine the extent of the magnetite; this survey indicates a lens about 30 feet in length. The lack of continuity, or the pocket character of the deposit, is an obstacle to the extraction of the ore for commercial purposes.

At several places in the Triassic basalt along the Bay of Fundy magnetite and magnetic hematite occur in pockets a foot or so wide and a few feet long. Occurrences are recorded near Scots Bay village, at Vernon Mines northwest of Kentville, and north of Berwick. These deposits are of no economic importance.

Grafton Magnetite (51)

Lat: 45° 06' 54"
Long: 64° 42' 31"
Ref. Map: 21nbsp;H 2 East Half

This deposit occurs on the south slope of the North Mountain in open pasture land. It is several hundred yards west of the Mountain Road at a point 0.9 miles north of Buckleys Corner.

The prospect consists of two pits seven feet deep. It occurs in Triassic basic lava and during 1941 a few truck loads of ore were taken out.

The ore is magnetite which has filled a fracture in the basalt. The magnetite was deposited first on either wall and the last solution which came in deposited quartz, some of which is amethystine. The average thickness of the ore judging from the specimens on the dump would be 6 or 7 inches at the most. Recent work indicated that the magnetite occurs as a lens less than 50 feet in length. The area in the vicinity of the showing was bulldozed at several places but no magnetite was uncovered.

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Digby County

Iron Occurrences in Digby County (52)

Lat: 44° 33' 00"

Long: 66° 01' 00"
Ref. Map: 21nbsp;B 9 East Half

Indications of iron ore have been reported on Digby Neck from about 2 miles west of the town of Digby for at least 6 miles westward.

The past history of this area is confusing prior to 1907 when the Dominion Iron and Steel Company became interested in the area through a promoter, Lewis Bean, of Philadelphia. In 1911, this Company sent their own engineers to investigate the district. A rough magnetic survey was carried out and the most promising condition was found to exist on the farm of William Ross at Rossway. No work was done on this farm due to heavy drift cover but some prospecting was carried on to the south.

The rock exposed along Digby Neck is basaltic lava, in places holding disseminations of magnetite. Many cracks and fissures occur in the basalt and in some cases magnetite has been deposited along these, forming veins of varying widths. In some cases the veins are only a few inches wide, in others, the veins an 8" to 10" in width.

The prospecting carried out in 1911 by the Dominion Iron and Steel Company was in the area south of Rossway and comprises the settlements of Waterford and Centreville. In the 18-foot shaft sunk on Isiahs Heights farm, a 4-inch vein of magnetite was discovered. Trenching on the strike failed to disclose the continuation of the vein. This vein analyzed: iron 41.31 per cent, silica 34.04 per cent. The 2-inch vein found in the 15-foot shaft sunk on Isiah Bank's farm analyzed:

- iron 40.24 per cent,
- and silica 36.32 per cent.

Other analyses from the area indicate the tenor of the iron mineralization:

Values in per cent			
	(I)	(II)	(III)
Iron	59.00	56.22	60.43
Silica	13.50	22.02	14.32
Alumina	0.70	- - -	- - -
Lime	0.45	- - -	- - -
Magnesia	2.16	- - -	- - -
Phosphorus	.05	.02	.04
Sulphur	- - -	- - -	.05

Bloomfield Bog Iron (53)

Lat: 44° 32' 00"
Long: 65° 50' 00"
Ref. Map: 21 A 12 West Half

At Bloomfield and at several other points in the vicinity, there are beds of bog iron ore yielding up to 25 per cent metallic iron. The iron occurs a few inches below the surface in layers from half an inch to two feet thick. Some of the bog iron was mixed with the ore mined near Clementsport and smelted in a furnace on the Moose River. There is no mention of the extent of the bog iron occurrences.

Reference

Ingall, E. D., 1898:
Geol. Surv. Canada Rept., p. 1115.

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Cape Breton Island

Iron ore occurs at several points in this county, but the deposits are as a rule in the form of narrow veins or pockets. The ore is good grade, but the quantities are in most cases not sufficient to form commercial orebodies.

Barachois Area

The Ingraham or McAllister Iron Ore (54)

Lat: 46° 08' 02"
Long: 60° 26' 50"
Ref. Map: 11nbsp;K 1 West Half

The Ingraham or McAllister Iron prospect is located immediately south of the village of Ironville on the crest of a hill approximately 300 feet above sea level. The distance to the main highway along the south of St. Andrew Channel is 1/4 of a mile and from Barachois Station on the Canadian National Railways about 2 miles.

Previous to 1898 information as to the work done is meagre. It was reported that several pits and one shaft were sunk and some ore was found, although the ore horizon did not appear to be extensive.

In 1902, the Dominion Iron and Steel Company took an option on the property. After some development work was performed, the option was dropped.

The Nova Scotia Steel and Coal Corporation operated the property for a short time about 1903 to shipped some 500 tons of the ore to the furnaces at Sydney. The ore was found unsatisfactory as it only carried about 45 per cent iron.

In 1919, Dominion Iron and Steel Company purchased several hundred tons of the ore. This ore ran 38.09 per cent iron and 22.05 per cent silica. This grade was, of course, unsatisfactory and work was stopped.

The geology in this district varies considerably. The crest of the hill and the north slope in this section have been eroded to expose crystalline limestone and dolomite and slate of the George River Group of Precambrian age. It is in this group that the iron deposit occurs, seemingly at the contact of the limestone with the slate. The strata strike north 22 degrees east and dip from 55 to 65 degrees to the southeast. Close by in the north slope of the hill is exposed sandstone and shales of the Windsor Group. On the south slope of the hill, the George River Group extends to near the base where rhyolite, dacite and andesite parallels the base of the hills.

The ore deposit on the Ingraham lease at Ironville consists of specular and massive hematite. It occurs in a grey limestone at or near its contact with the slate and has been traced by pits for over 3,000 feet on a bearing of north 22 degrees east. The dip of the ore horizon is between 55 to 65 degrees to the southeast.

At the main shaft which is reported to be 55 feet deep, with three levels running off it, a few pieces of good specular hematite were found on the dump. At 130 feet north of the main shaft is a series of open-cuts approximately 140 feet in length. Hematite is exposed on the dump. It was from these open-cuts that ore was shipped to the Nova Scotia Steel and Coal Company, at intervals between 1900 to 1912. The average analysis of all shipments made to Sydney from these open-cuts was as follows: iron 44.45 per cent and silica 16.10 per cent.

As the iron deposit in this area is apparently a contact deposit and occurs in a series of irregular lenses, the possibilities of a single body of large tonnage are rather remote.

A number of chemical analyses are available. The iron content is very variable and runs high in silica and lime in most samples, as shown by the following analyses.

Values in per cent				
Iron	**Silica**	**Sulphur**	**Phosphorus**	**Lime**
57.20	- - -	1.92	Tr.	- - -
59.90	4.46	2.50	.019	- - -
49.00	15.20	0.89	1.34	- - -
60.80	7.21	.009	0.01	5.24
43.90	10.01	.011	.025	- - -
41.32	14.09	.06	.08	10.39
40.38	13.79	.05	.04	11.90
36.17	23.40	.06	.08	10.75
42.80	15.77	.06	.05	9.16
39.50	16.78	- - -	- - -	10.92
39.33	16.40	- - -	- - -	10.26
51.80	5.75	.06	.04	6.9
52.02	11.57	.07	.05	3.87
48.70	4.62	.087	.065	9.25

References

Goudge, M. G., 1938:
Iron at Barachois, Nova Scotia Dept. of Mines, p. 145-151.

Woodman, J. E., 1909:
Iron ores of Nova Scotia, Mines Branch, Ottawa. Report No. 20, p. 217.

The McPherson Iron Prospect (55)

Lat: 46° 08' 30"

Long: 60° 24' 24"
Ref. Map: 11 K/1 West Half

This iron prospect is situated about 1 mile east of Barachois siding on the Canadian National Railways.

The workings lie in the Boisdale Hills, at an elevation of about 470 feet above sea level. Immediately north of the road from Boisdale to Leitches Creek are three shafts and a number of pits which expose crystalline limestone of Precambrian age with intrusions of granite and basic dikes. The iron from the excavations is black to purplish black, finely crystalline magnetite in many places showing considerable quality of pyrite. There is a large amount of lime mixed with the ore, in part as horses of the old limestone country rock, in part as calcite stringers.

The principal mining operations took place at shafts No. 1 to No. 2. No. 1 is sunk on an incline into the hillside, while No. 2 is vertical and is 20 feet deep. Generally speaking it may be said that the ore is very irregularly distributed in stringers and pockets, which are likely either to swell or pinch out within a very short distance. It is reported that 3 feet of clean ore occurs but in most of the points where the veins are visible they do not exceed 12 to 15 inches.

A sample taken from a small stock pile gave the following analysis:

Values in per cent	
Iron	58.10
Lime	0.35
Silica	6.82
Phosphorus	0.004
Sulphur	0.50
Magnesia	6.90
Magnesia	6.90
Alumina	1.92

References

Lindeman, E., and Bolton, L. L., 1917:
Iron ore occurrences in Canada, Vol. 2, Mines Branch, p. 197.

Woodman, J. E., 1909:
Iron ores of Nova Scotia, Mines Branch, Vol. 20, p. 217.

Boisdale Area

Curry or Steeles Crossing Hematite (56)

Lat: 46° 02' 21"
Long: 60° 27' 40"
Ref. Map: 11nbsp;K 1 West Half

The Curry deposit is a mile south of the crossing of the Frenchvale and Boisdale-East Bay road. It is 6 miles from Boisdale Railway Station. The hematite was mined in 1903 but the mineralization was known long before Fletcher mentions it in his report for 1875.

The hematite is found in a band less than 10 feet wide, in white limestone and dolomite of the George River Group of Precambrian age. The strike of the formations is north 70 degrees east, dipping vertically, or at a high angle towards the south. Near the iron mineralization, a pegmatite granite intrudes the limestone.

The principal showing occurs in a trench 100 feet in length and 14 feet wide from which several hundred tons of ore is stockpiled. The ore is reported to have had a width at the surface of from 5 to 9 feet, but it pinched out at a depth of 12 feet. Later attempts to locate the ore at greater depth by diamond drilling was unsuccessful. About 75 feet northeast of the main workings a small pit and a trench expose limestone but no ore, and all that can be seen of the ore in places are a few narrow veins of hematite in limestone at the west end of the main pit, ranging in width from 2 to 8 inches.

In 1913 to 1914, 4 drill holes were put down in the area. Logs of the holes are presented below.

In 1962, five holes were drilled in the area in a search for base metal deposition. All of the core was examined and several sections tested. Small amounts of sphalerite occur as disseminations in the limestone and dolomite. No indication of hematite was observed.

The hematite in the pit and on the dump is massive and of good grade, as shown by the following analysis, representing an average sample of the stockpile:

Values in per cent	
Iron	56.79
Silica	12.75
Phosphorus	.008
Sulphur	.022

Hole No. 1. Rear Boisdale, on the farm of Angus Currie, 546 feet east of his barn, and 9 feet west of Currie's Brook. This hole was down 368 feet when this boring began on May 10, 1913. The hole was bored to 613 feet, and was finished on June 7, 1913; distance bored 245 feet in search of iron ore. Strata dipping south; dip varying from 80 to 87 degrees.

Name of Rock	Color and Other General Characteristics	Thickness Bored	Total Depth
	Began at 368 feet		
Limestone	Hard, grey	16' 04"	368'
"	Hard, grey	9' 06"	384' 04"
"	Hard, grey	11' 06"	405' 04"
"	Hard, grey	7' 08"	413"
"	Showing iron	3' 04"	416' 04"
"	Hard, grey	7' 04"	423' 08"

"	Hard, grey	1' 08"	425' 04"
"	Showing iron	10' 04"	435' 08"
"	Showing iron	7' 00"	442' 08"
"	Showing iron	5' 01"	447' 09"
"	Hard, grey	14' 10"	462' 07"
"	Hard, grey	7' 03"	469' 10"
"	With feldspar	5' 02"	475'
"	Hard, grey	7' 00"	482'
"	Hard, grey	16' 01"	498' 01"
"	Hard, grey	3' 05"	501' 06"
"	Hard, grey	111' 05"	613' 01"
Depth of Hole 613' 01"			

Hole No. 2, on the property of Angus Currie, Rear Boisdale, 288 feet north-west of Mr. Currie's house, and 100 feet southeast of supposed ore vein. Hole drilled in a northwest direction at an angle of 45 degrees. Hole bored in search of iron ore.

Name of Rock	**Color and Other General Characteristics**	**Thickness Bored**	**Total Depth**
Surface	Soil	10'	10'
Slate		6' 02"	16' 02"
Limestone	Streaks of iron ore	6' 06"	22' 08"
Slate	Grey streaks of iron	10' 05"	33' 01"
Limestone	White	27' 01"	60' 02"
Slate	Greenish	1'	61' 02"
Limestone	White		85' 02"
Limestone	Showing iron	6' 04"	91' 06"
Limestone	Showing iron	4' 02"	95' 08"
Granite		95' 08"	183' 06"
Limestone		5' 07"	189' 01"
Granite			246' 04"
Limestone			262'
Granite			274' 08"
Slate			279' 08"
Granite			322' 02"
Limestone			390' 08"
Granite			407' 04"
Limestone			410' 04"
Granite			460' 06"

Limestone			468' 02"

Hole No. 3, at Rear Boisdale, on the property of Angus Currie, and 230 feet north of borehole No. 2. Hole drilled vertically in search of iron ore.

Name of Rock	Color and Other General Characteristics	Thickness Bored	Total Depth
Surface	Soil	7' 0"	7' 0"
Limestone	Coarse, grey	10' 08"	17' 08"
Limestone	Grey	27' 06"	45' 02"
Limestone	Streaked with iron	6' 0"	51' 02"
Slate	Brown with iron	9' 02"	60' 04"
Limestone	White	4' 03"	64' 07"
Slate	Streaked with iron	1' 02"	65' 09"
Limestone	White	3' 03"	69' 0"
Limestone	Grey bands of slate and red hematite	15' 06"	84' 06"
Limestone	Grey bands of slate and red hematite	5' 01"	89' 07"
Limestone	Grey bands of slate and red hematite	23' 01"	113' 05"
Limestone	Bands of slate	14' 07"	128'
Limestone	Bands of slate	6' 04"	134' 04"
Slate	Greenish	1' 06"	135' 10'
Limestone	White	48' 00"	183' 10"
Quartz	White, pink feldspar	215' 08"	

Hole No. 4. At Rear Boisdale on the property of Mr. Angus Currie, 100 feet north of borehole No. 3. Hole drilled vertical in search of iron ore.

Name of Rock	Color and Other General Characteristics	Thickness Bored	Total Depth
Surface	Soil	2'	
Limestone	Grey	10' 06"	12' 06"
Limestone	Grey	19' 08"	32' 02"
Green Slate	Streaks of hematite	3' 10"	36'
Limestone	Grey	2' 02"	38' 02"
Green Slate	Streaks of hematite	1' 06"	39' 08"
Limestone	Grey or white	22' 10"	62' 06"
Limestone	Grey or white	27' 07"	90' 01"
Limestone	Grey or white	25' 05"	115' 06"
Limestone	White	27' 03"	142' 09"
Limestone	White	24' 06"	167' 03"

Limestone	White	15' 09"	183'
Limestone	White	15' 03"	198' 03"
Limestone	White	13' 06"	211' 09"
Limestone	White	10'	221' 06"
Limestone	Brownish	5' 09"	227' 06"
Limestone	White	7' 09"	235' 03"
Limestone	Grey	17'	252' 03"
Limestone	Grey	11'	263' 03"
Limestone	Grey	16' 06"	279' 09"
Limestone	Grey	4' 08"	284' 09"
Limestone	Brown	4' 04"	288' 09"
Limestone	Grey	10' 05"	299' 02"
Calcareous Rock	Green with serpentine	2' 02"	301' 04"

References

Lindeman, E., and Bolton, L. L., 1913:
Mines Branch, Summary Report, p. 31.

Gilpin, E., Jr., 1891:
Trans. Can. Soc. Civil Engineers, Vol. V.

Other Iron Occurrences

Big Pond (Breac Brook) Iron Occurrence (57)

Lat: 45° 55' 30"
Long: 60° 29' 50"
Ref. Map: 11nbsp;F 16 West Half

The iron deposit is situated east of the settlement of Big Pond, Cape Breton County. It may be reached by secondary road leaving Highway No. 4 opposite the Big Pond school building.

The property is underlain by acid and basic lavas, pyroclastics, and sediments of the Fourchu Group, believed to be Precambrian in age. The rocks of the Fourchu Group are steeply dipping. They are overlain unconformably by flat-dipping Windsor Group rocks.

High grade hematite float occurs along the highway, two miles east of Big Pond. An average sample yielded the following analysis: iron 60.05 per cent; silica 12.38 per cent, sulphur .03 per cent, and manganese 0.19 per cent.

Five old caved shafts or pits occur in the area. The location of the shafts provide a good indication of the position and strike of the hematite bed.

The hanging wall in the shaft area is pale grey, soft schistose pyroclastics which have been deeply weathered. A hematite cemented breccia occurs on the footwall, underlain by rocks similar to those on the hanging wall. The breccia suggests the hematite may have been deposited along a fault structure across a width of 9 feet and on strike for roughly 1,000 feet.

Some years after 1874 the Dominion Iron and Steel Company examined the area but found all the deposits to be small. The only analysis available from their work is as follows:

Iron	Silica	Phosphorus	Sulphur	Magnesia
61.39%	8.78%	Trace	Trace	1.22%

References

Newell, J. M., 1958:
Exploration Report on Big Pond presented to Rio Tinto Canadian Exploration Limited (Copy on file, N. S. Dept. of Mines).

Lindeman, E., and Bolton, L. L., 1917:
Iron ore occurrence in Canada, Mines Branch, Ottawa, Vol. 2, No. 217, p. 196.

Hematite Showing at Ben Eoin (58)

Lat: 45° 58' 00"
Long: 60° 27' 00" (approximate)
Ref. Map: 11nbsp;F 16 West Half

This iron occurrence is located on the east side of East Bay, Cape Breton County. The deposit is located near the contact of Carboniferous conglomerate (Horton Group) with the Fourchu Group rocks. Two tunnels have been driven from the lake level into the hill, one being reported to have a length of 90 feet. No ore can be seen in place, the deposit having been removed to the water level. Farther up the ridge, several shallow pits were dug in the conglomerate, and a shaft sunk 40 feet without cutting any ore.

Reference

Lindeman, E., and Bolton, L. L., 1917:
Iron ore occurrences in Canada, Mines Branch, Ottawa, No. 217, p. 196.

Big Lorraine Iron Occurrence (59)

Lat: 45° 55' 30"
Long: 59° 55' 30"
Ref. Map: 11nbsp;G 13 West Half

At Big Lorraine East, Cape Breton County, the country rock is a conglomerate which resembles the Horton conglomerate, the basal member of the Carboniferous in Nova Scotia. It is very much sheared and crushed in parts of the area, sometimes to such an extent that it is difficult to recognize its conglomeratic character. The pebbles and boulders include some fine grained, igneous rocks and slates. The matrix was originally a mud containing ferruginous material. Upon exposure some of the iron has passed into solution and stained the surfaces and joint planes of the outcrops.

On the west side of the Big Lorraine Bay, there are some igneous rocks which appear to be dykes or sills. They require further study but there is no apparent mineralization, except the *iron staining referred to.*

There have been a number of samples of iron ore picked up in the area. From the eastern side of Big Lorraine Harbour, and inland on a bearing of 65 degrees magnetic, there are indications of float in the hollows. Some of these specimens are a poor grade of hematite and some are limonite after siderite. All the specimens are quite well rounded. Residents in the area have not seen any iron ore in place similar to the float obtained.

These facts would suggest a small iron deposit in the neighbourhood of Clark or Mira Bay, which has been eroded and transported by glacial ice.

For commercial purposes the iron occurrences of Big Lorraine have no economic value.

Reference

Douglas, G. V., 1943:
Ann. Rept. N. S. Dept. of Mines, p. 127-128.

Grand Mira Iron (60)

Lat: 45° 52' 00"
Long: 60° 18' 30"
Ref. Map: 11nbsp;F 16 West Half

Ordovician ore beds of oolitic hematite grading to magnetite are interstratified with sandstone and shale near Grand Mira. According to Hayes, the beds range in thickness from 4 1/2 to 9 inches and are located at a number of localities between Grand Mira and Marian Bridge. They appear to be folded into a syncline in which the east limb is cut off by the white Granite Hills, and magnetite is present in beds near the granite.

References

Gross, G. A., 1967:
Geology of iron deposits in Canada, Economic Geology, Rept. 22, Geol. Surv. Can., Vol. 2, p. 17.

Hayes, A. O., 1919:
Nova Scotia oolitic iron deposits of Sedimentary Origin, Trans. Can. !nst. Mining Meta., Vol. 22, p. 117-122.

Iron Deposit at Grand Mira South (61)

Lat: 45° 53' 15"
Long: 60° 17' 00"
Ref. Map: 11nbsp;F 16 West Half

The iron deposits occur as clean-cut beds in a slate formation, which has been drag folded. Where both beds are present, they are separated by about two feet of slate. The iron minerals are hematite and magnetite with a minor amount of gangue material. The veins strike north 84 degrees east with a 65 degree north dip. Douglas gives six analyses of the iron ore bands in which the iron content ranges from 49.36 to 63.76 per cent; sulphur from a trace to .004 per cent, and phosphorus from 0.25 to 0.56 per cent, silica from 4.71 to 13.38 per cent.

The iron-bearing beds are considered to be primary sediments and some of the iron in them has been altered to magnetite by the nearby granitic intrusion of Gillis Mountain. If the ore beds were wider, they could be considered to have commercial possibilities.

The occurrence was discovered many years ago, and in 1942 the Dominion Steel and Coal Corporation cleaned out several of the earlier pits and dug two shallow openings. The beds of iron formation occur in Middle Cambrian strata on Gillis Brook.

In 1949, two diamond drill holes were put down to check the iron occurrence at Grand Mira South. The following records are taken from the Annual Report of the Nova Scotia Department of Mines for 1949.

Diamond drill No. 4 was employed by the Department from May 6 to July 6, 1949 drilling for iron at Grand Mira South, Cape Breton County, on Claim H, Tract 3, Ref. Map 11nbsp;F 16 C.

Record No. 1527 BoreHole 1

Strata	Thickness, Ft.	Total Depth, Ft.
Overburden	60.0	60.0
Slate, grey, mineralized with pyrite	15.0	75.0
Slate, grey	53.0	128.0
Hematite, dark red	0.3	128.3
Slate, grey	1.7	130.0
Magnetite, black	1.2	131.2
Slate, grey	18.8	150.0

Record No. 1529

Borehole No. 2 was drilled through 20 feet of overburden, the remainder being grey slate with 2 feet of magnetite.

Strata	Thickness, Ft.	Total Depth, Ft.
Overburden	20.0	20.0
Slate, grey	110.6	130.6
Hematite, dark red	.2	130.8
Slate, grey	4.2	135.0

References

Douglas, G. V., 1943:
Ann. Rept. of N. S. Dept. of Mines, p. 137-138.

Gross, G. A., 1967:
Geology of iron deposit in Canada, Economic Geology, Rept. 22, Geol. Surv. Canada, Vol. 2, p. 17.

Weeks, L. J., 1954:
    Southeast Cape Breton Island, Nova Scotia, Geol. Surv. Canada Mem. 277, p. 108-109.

McVicar Iron Prospect (62)

Lat: 45° 48' 43"
Long: 60° 30' 15"
Ref. Map: 11nbsp;F 15 East Half

The McVicar property is located about 1.5 miles east of Enon post office and about 1,200 feet south of the Salman River road.

Exploration work carried out by Dominion Iron and Steel Company exposed some hematite in Carboniferous (Windsor Group) rocks at the contact with rocks of the Fourchu Group of Precambrian age. Judging from the material taken from the workings, the ore occupies irregular fissures and cavities in the Carboniferous conglomerate. Where unmixed with wallrock, the ore is compact hematite of good quality, and carries in places a considerable amount of manganese.

Smitheringale states "that a shaft was sunk 25 feet deep through Carboniferous limestone to an ore-bearing bed carrying hausmannite in association with calcite, rhodochrosite, manganite, pyrolusite, limonite and hematite".

Granite is exposed in the area of the mineralization. Windsor limestone debris comprises the bulk of waste material beside the workings. It may be assumed that the Windsor rocks, when present are very thin, and overlie the pre-Carboniferous rock on a slightly irregular surface.

A picked sample from one of the stock piles gave the following analysis:

- iron 62.10 per cent,
- insoluble 9.70 per cent,
- phosphorus .007 per cent and
- sulphur .03 per cent.

References

Hanson, G., 1932:
    Manganese, Geol. Surv. Canada, Econ. Geol. Ser. No. 12, p. 32.

Smitheringale, M. Y., 1928:
    Manganese deposits of the Maritime Provinces; Manuscript Report written in 1928.

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Inverness County

The Whycocomagh district is situated in the centre of the Island of Cape Breton, at and near the head of St. Patrick Channel, a long arm of Great Bras d'Or Lake which reaches westward from the main sheet of water. Whycocomagh is approximately 65 miles from Sydney.

The earliest mention of iron ore in this district is contained in the Nova Scotia Mines Report for 1874. The report states that at the Indian Reserve, Whycocomagh, some 9 deposits of iron interbedded with slate have been exposed over a few hundred yards. Heavy overburden made prospecting slow but it was reported a 9-foot bed of magnetic ore yielded 46 per cent iron and a 6-foot bed of hematite yielded 56 per cent iron.

Iron Brook Occurrence (63)

Lat: 45° 57' 00"
Long: 61° 09' 40"
Ref. Map: 11nbsp;F 14 East Half

In 1897, on the south bank of an unnamed brook east of McAskill Brook, Whycocomagh area, three tunnels were driven and considerable prospecting carried out. The orebody cut in the upper tunnel and shaft appears to be an irregular filling rather than a lode and its shape is very irregular. The ore is magnetic hematite, often very fine and granular to compact, in some cases rather coarse.

The ore is, as a rule, of low grade being associated with a considerable amount of quartzite, and it also contains a large amount of pyrite in places.

Several analyses are available of the iron ore from the Iron Mines prospects. They are presented in the following table:

Values in per cent							
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)
Iron	56.00	46.16	57.20	60.00	57.05	56.60	46.70
Silica	10.04	24.34	14.80	6.00	11.16	9.00	23.70
Alumina	5.85	5.52	- - -	- - -	5.25	7.96	- - -
Lime	- - -	- - -	- - -	- - -	1.66	1.68	- - -
Magnesia	- - -	- - -	2.75	2.40	1.80	1.95	- - -
Phosphorus	Tr.	Tr.	1.00	3.56	0.49	0.8	0.57
Sulphur	0.14	0.51	Tr.	Nil	.006	.009	0.12

On Argyle Brook (No. 64), Lat: 45° 59' 30", Long: 61° 02', which is 5 miles east of Whycocomagh, specular hematite occurs in irregular fissures in the lower Carboniferous conglomerate (Horton Group), none of which exceed 4 inches in thickness. There is nothing to indicate permanence of the deposit and all evidence points rather to the absence of a workable deposit. Moreover, even picked specimens are not of high grade, so intimately are the country rock and ore mingled.

A sample of 500 pounds of as clean ore as could be found was analyzed with the following results:

- iron 46.20 per cent,
- silica 25.77 per cent,
- alumina 5.01 per cent,
- phosphorus .10 per cent and
- sulphur .02 per cent.

On the south bank of Campbell Brook (No. 65), Lat: 45° 59', Long: 61° 06', limestone of

Precambrian (George River Group) age is irregularly impregnated with ferruginous silicate minerals, chiefly hornblende which is in places altered to magnetite. Although large dimensions have been claimed for the ore, a width of a few inches and depth and length of a few feet were the greatest limits seen in any place. There is no true mineralized area, and at most no more than a few tons of ore of any grade could be obtained.

Magnetite Deposit at Upper Glencoe (66)

Lat: 45° 55' 30"
Long: 61° 19' 00"
Ref. Map: 11nbsp;F 14 West Half

Location

This iron prospect is located in the county of Inverness, at Upper Glencoe, and can be reached from Orangedale by a road passing by way of Whycocomagh a distance of 25 miles. From River Denys Station, the distance is 12 miles and from Glencoe on the Inverness Railway 10 miles.

History

In 1912, Mr. J. S. Hart of Port Hood discovered in a trench, 8 feet deep, and in a pit nearby, a deposit of magnetite.

In June 1912, the Dominion Iron and Steel Company started work on the property. During the period from June to October a shaft was sunk to a depth of about 300 feet. The magnetite concentrations were found to be in a succession of lenses of varying sizes, all drift covered. Upon sinking the shaft, it was found that the sulphur content of the ore increased rapidly after the zone of surface weathering had been passed through.

In 1913, a magnetometric survey was made by E. Lindeman of the Department of Mines, Mines Branch, Ottawa, of an area measuring 1,500 feet by 600 feet and embracing the iron ore deposits. Three areas of relatively high magnetic attraction were mapped (Fig. 20).

Figure: (Not presently available)
Figure 20. Magnetic survey and location of drill holes and shafts, Upper Glencoe iron, Inverness County, Nova Scotia

Between 1914 to 1917 the mining rights were held by the Nova Scotia Steel and Coal Company who explored the area lying north of the main shaft. At a position between 640 and 710 feet north of the shaft, an open pit 10 feet wide was sunk 10 feet in ore. From the northeast side of the pit, a drift 10 feet long was driven northeast. About 250 feet north of the open pit a shaft was sunk to a depth of 45 feet.

Records indicate that 90 tons of ore were taken from the open pit and shipped for treatment at New Glasgow. The ore of this shipment was found to unsatisfactory due to the high sulphur content.

In 1921, a few diamond drill holes were sunk by the Nova Scotia Steel and Coal Company, in the area between their former workings. One of these vertical holes is reported to have penetrated through 9 feet of magnetite occurring at the contact between crystalline limestone and granite. No records of these boreholes are available.

In 1941 the Dominion Steel and Coal Company considered the possibility that the deposit might prove of value as a source of open-hearth lump ore. In 1942, five diamond drill holes were put down to explore for possible extensions of the better known parts of the deposits. In none of the drill holes was ore of commercial importance encountered. (Figure 20 - Location of drill holes and magnetic data.)

Geology

The Craignish Hills are underlain by Precambrian rocks but in the vicinity of the iron deposits bedrock is entirely concealed by glacial till. Information obtained from shafts, pits and bore holes shows that the area is underlain by crystalline limestone and, to the west of the limestone, an intrusive body of syenite with granitic and dioritic phases. Along the contact between the syenite and limestone, there is a zone varying in width from a few feet to several yards that consists chiefly of a fine grained, pale greenish grey, calcareous pyroxenite in which there are lenticular bodies of magnetite.

It is inferred from dip needle readings that bodies of magnetite occur in four areas distributed along a line trending northerly and about 2,400 feet long (Fig. 20).

A shaft said to be about 45 feet deep was sunk through 18 feet of till into bedrock within the most northerly of the four areas. From an examination of the dump, it may be inferred that this opening penetrated crystalline limestone and massive magnetite. A few blocks from 6 inches to 1 foot in diameter of magnetite were observed.

The second area lies 125 feet south of the first. It has been partly explored by an open-pit, from which extends a very short drift, by trenches and by diamond drill holes. The available records of these workings do not closely define the limits of the magnetite body that is present. Its northern part may be interpreted as being a mass at least 100 feet long and averaging about 10 feet in thickness that dips towards the east at a low angle. It occurs in metamorphic rocks between overlying crystalline limestone on the east and underlying syenite on the west. The form and dimensions of the southern part of the body are not known. There is evidence that magnetite is present.

Drill holes No. 151 feet long and No. 4, 240 feet long were sunk vertically (in 1942) 70 feet and 95 feet respectively to the east of the Scotia pit dug in ore (Fig. 20, Fig. 21, and Fig. 22). Both holes intersected the limestone-granite contact at a depth of about 100 feet and continued into the igneous rock and did not encounter magnetic concentrations.

Figure: (Not presently available)

Figure 21. Plan of diamond drill hole No. 3, Upper Glencoe ion, Inverness County, Nova Scotia

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Figure: (Not presently available)

Figure 22. Plan of diamond drill hole No. 4, Upper Glencoe ion, Inverness County, Nova Scotia

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The Scotia pit is 60 feet long, 10 feet wide and ranges from one foot to ten feet in depth. From it was obtained the 90 tons of ore that was shipped sometime during the period 1914 to 1917.

The third area of abnormal magnetic attraction lies 75 feet south of the second. In the northern part of this area, at the site of the original discovery, a trench 16 feet long, east-west, and 4 feet wide has been sunk through overburden to bedrock. At the east end crystalline limestone is exposed in contact with underlying massive magnetite that extends westward from the contact. At some places the contact appears to dip east at an angle of 45 degrees, at other places the easterly dip is steeper. West from the contact, there is an exposed width of 10 feet of massive magnetite, succeeded by a 2-foot zone consisting of irregular pellets of magnetite in a cement of fine grained calcareous pyroxenite. This zone is followed on the west for 4 feet by a zone consisting chiefly of massive magnetite but with some intermixed pyroxenite.

Along the course of the limestone-granite contact, at a point about 60 feet west-northwest from the trench, a pit was sunk to bedrock and revealed massive magnetite at this place.

Drill hole No. 1 starting 60 feet east of the trench and angling 60 degrees downward, toward the west (i.e. towards the trench) encountered only a minor amount of magnetite (Fig. 23).

Figure: (Not presently available)
Figure 23. Plan of diamond drill hole No. 1, Upper Glencoe iron deposit, Inverness County, Nova Scotia

If the magnetite in the trench and the two thin seams of magnetite penetrated by the drill hole are continuous with one another, it would indicate that the magnetite body extends downward 60 to 70 feet along a dip of about 45 degrees and that it decreases from a width of 12 feet or so at the surface to two narrow bodies 9 inches and 15 inches wide respectively. The 9-inch body consists of 1/4 inch layers of magnetite alternating with what are apparently relics of thin limestone beds. The 15-inch body consists of irregular nodules and pellets of magnetite in a cement of calcareous amphibolite.

About 200 feet south of the trench, a shaft was sunk to a depth of 60 feet and at the bottom a cross cut was driven west for 34 feet. An interpretation of available records indicate that the shaft went down through drift into crystalline limestone; that at between 12 to 18 feet depth a concentration of magnetite was passed through; that between 18 to 45 feet depth a zone of metamorphic silicate rock holding nodular masses of magnetite was found; that beneath this was a tabular mass 10 feet thick of massive magnetite apparently dipping about 20 degrees toward the east, with granitic rocks below. The cross cut to the west encountered granite only.

A diamond drill hole sunk vertically 15 feet east of the shaft to a depth of 64 feet penetrated massive magnetite at depth between 50 to 63 feet. (Previous drilling)

About 100 feet northeast of the shaft, drill hole No. 2 was sunk (Fig. 20 and Fig. 24). It was inclined westerly at an angle of 60 degrees and drilled to a depth of 192 feet. The limestone-granite contact was intersected at a vertical depth of around 58 feet. No magnetite was intersected. It is apparent from the drilling results that the magnetite occurs in pods and lenses in highly altered limestone inclusions in the granitic rocks. Drill hole No. 5 (Fig. 20 and Fig. 25) was directed to investigate this zone between drill holes 1 to 2. No magnetite was encountered.

A fourth area of abnormal magnetic attraction lies 300 feet south of the area investigated by drill holes 2 to 5.

Figure: (Not presently available)
Figure 24. Plan of drill hole No. 2, Upper Glencoe iron deposit, Inverness County, Nova Scotia

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Figure: (Not presently available)
Figure 25. Plan of drill hole No. 5, Upper Glencoe iron deposit, Inverness County, Nova Scotia

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Analyses

A number of analyses have been made of samples of the magnetite exposed in pits and workings and of these, Nos. 1, 2, 3 to 4 are given by the Dominion Steel and Coal Company as representative of the grade of the ore encountered during the period of most active exploration in 1912.

Values in per cent						
	(I)	(II)	(III)	(IV)	(V)	(VI)
Iron	59.85	62.65	57.54	58.50	62.68	49.40
Silica	6.64	5.12	4.94	6.86	5.26	12.18
Sulphur	0.26	0.58	1.35	1.00	2.20	.003
Phosphorus	0.05	0.08	0.11	- - -	- - -	- - -

In two areas, the evidence seems to indicate the presence of irregular, roughly tabular bodies of magnetite with an average thickness of about 10 feet, and dipping at low angles toward the east along the limestone-granite contact. The few exploratory drill holes designed to explore this contact have failed to reveal any important concentration. Judging from the magnetometric survey, the ore bodies are, however, very small and irregular and are not considered to be of economic importance.

In 1959 the writer accompanied by Dr. George Aletan, metallurgist at the Nova Scotia Technical College, Halifax, examined the area and collected samples for a chemical analysis and microscopic study. The following is a statement by Dr. Aletan on the microscopic examination. "Magnetite altered to hematite, is fine grained and closely associated with silica".

Coarse grinding to 1/4 inch and gravity concentration could only partially remove the silica as silica is usually contaminated by finely accumulated hematite.

A chemical analysis of the Upper Glencoe iron made in 1959 is as follows:

- iron 65.3 per cent,

- silica 5.3 per cent,
- phosphorus .018 per cent,
- sulphur trace and titanium .08 per cent.

An average of the ore mined previously is reported as follows:

- iron 62.7 per cent,
- silica 5.26 per cent,
- phosphorous .01 per cent and
- sulphur 0.22 per cent.

References

Aletan, G. A., 1959:
Preliminary metallurgical investigation of various iron ores from Nova Scotia, N. S. Dept. of Mines.

Brown, J. F. K., 1913:
Report to Dominion Iron and Steel Company, Sydney, Nova Scotia (N.S.D.M. file).

Lindeman, E., and Bolton, L. L., 1913:
Mines Branch, Summary Rept. p. 31.

Lindeman, E., and Bolton, L. L., 1917:
Iron ore occurrences in Canada, Mines Branch, Vol. 2, No. 217.

Tanton, T. L., 1942:
Upper Glencoe magnetite deposit, Inverness County, Nova Scotia, Geological Survey of Canada.

Woodman, J. E., 1909:
Mines Branch, Ottawa. Report No. 20, p. 209.

Emerald Iron Prospect (67)

Lat: 46° 15' 04"
Long: 61° 03' 16"
Ref. Map: 11nbsp;K 6 East Half

This prospect is located 5.5 miles from the trunk highway along the road from Northeast Margaree to Emerald and Mt. Pleasant, Inverness County.

About 1/2 mile up Murphy's Brook, a 20-foot tunnel was driven into the north bank and directly opposite a 10-foot tunnel into the south bank. Quartz float was found in the area and an examination of the tunnels indicated that they had been driven on a quartz vein. The surrounding rock is igneous, reddish in color, and classed as red syenite and felsite. Black to dark brownish black segregations occur in the quartz. Mineralogical and qualitative chemical tests proved it to be specular hematite.

Reference

Messervey, J. P., 1942:
Memo to Mines Minister

Mabou Harbour Iron (68)

Lat: 46° 05' 19"
Long: 61° 27' 25"
Ref. Map: 11nbsp;K 3 West Half

In a trench on the farm of John McPhee at Mabou Harbour mouth, a 3-foot vein of mixed hematite and red shale was exposed. The vein dips 35 degrees east and the country rock is a red shale liberally sprinkled with hematite. Although the deposit appears to be uneconomical, 3 samples of the vein material were analyzed for iron.

Values in per cent	
Sample	**Iron (Fe)**
1	29.3
2	24.7
3	39.3

Reference

Grant, R. I., 1953:
Notes on Mabou Harbour iron prospect, N. S. Dept. of Mines, (report on file).

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Richmond County

Grand River Iron Prospect (69)

Ref. Map: 11nbsp;F 10 East Half

The property is located on the Grand River barrens about two and one half miles south from McNabs Cove on the Bras d'Or Lakes in Richmond County.

About 1900 the district was prospected by trenching and some shallow shaft sinking, but there is no record of the results obtained. In 1929, Mr. H. B. Gillis reported on the property for the Dominion Coal and Steel Company. No further work has been carried out on the property.

The rocks in the area belong to the Horton Group of continental sediments and consist of quartzite and slates. They strike northwesterly and dip 80 degrees northerly.

The deposit appears to consist of two separate occurrences - one being a limonite and the other a hematite. Boulders of limonite are found on the surface in large numbers and can be followed for approximately one mile. The reported occurrence of hematite is about one quarter of a mile east of the limonite deposit. It appeared that the ore had been uncovered for several hundred feet, but no estimate of width could be obtained.

The only available analyses are given below:

Values in per cent			
	(I)	(II)	(III)
Iron	60.00	59.20	60.08
Silica	1.28	2.20	4.25
Manganese	Tr.	- - -	- - -
Phosphorus	.140	.190	.143
Sulphur	.330	.344	.027

Reference

Gillis, H. B., 1929:
Report to Dominion Coal and Steel Company.

Hay Cove Iron Occurrence (70)

Lat: 45° 46' 00"
Long: 60° 41' 00"
Ref. Map: 11nbsp;F 15 East Half

The deposit is located on the south shore of the Bras D'Or Lake in Richmond County, Nova Scotia. It is approximately 40 miles from Sydney on Highway No. 4. The deposit is reached by travelling 1 1/4 miles east on the Loch Lomond road which meets Highway No. 4 at the Hay Cove school then going 1/4 mile south on a tote road, known locally as the Piper's road.

The area is underlain by an outlier of Carboniferous sediments resting unconformably on the Fourchu Group of Precambrian age. About 1 1/2 miles upstream from the highway, Toms Brook crosses two fairly wide fault zones, between which there is a soft, fine grained yellow to pink sandstone. The most northerly of the faults contains the mineralized zone. This zone is 6 feet wide and has been traced for approximately 50 feet. The ore carries considerable pyrite and is highly magnetic.

In 1931, a tunnel was driven 36 feet into the west hillside near the brook. Over 5 feet of manganese was intersected and the last 15 feet of the tunnel intersected limonite-bearing sandstone. Considerable work was done in the area but the results were disappointing due to the excessive amount of silica. The work done in 1914 indicated a small iron zone.

Analyses - Hay Cove Iron				
Values in per cent				
Iron	Silica	Phosphorus	Manganese	Remarks
16.68	38.40	0.10	18.06	Limonite in drift
38.76	10.04	2.25	0.80	" " "
47.92	9.52	1.17	2.09	" " "
23.71	12.92	.14	17.66	" " "
17.80	25.16	.11	13.81	
48.60	11.44	- - -	2.44	
36.44	27.88	- - -	1.60	

36.22	25.28	- - -	0.25	
29.77	15.00	- - -	6.64	
24.77	12.56	- - -	2.44	
58.52	6.40	- - -	- - -	
62.44	6.40	1.05	- - -	Earthly type of ore
62.85	4.09	- - -	- - -	" " "
48.73	23.04	- - -	- - -	
62.29	7.98	- - -	- - -	
52.43	10.16	- - -	- - -	

Reference

Ward, C. N., 1914:
Iron prospect at Hay Cove, Richmond County; Report to Dominion Iron and Steel Company.

Robinson Cove Iron Deposit (71)

Lat: 45° 41' 35"
Long: 60° 46' 15"
Ref. Map: 11nbsp;F 10 West Half

This property, also known as the MicMac Mine, is situated on both sides of the brook running into Robinson Cove. This cove is on the south shore of Bras D'Or Lake, in Richmond County. The prospect is not far from the main highway being 7 miles from St. Peters and 50 miles from Sydney.

About 1880 considerable prospecting was done in the way of sinking shafts, driving tunnels and putting down bore holes. In 1900 the property was examined by Mr. Carlsson for the Dominion Iron and Steel Company. He carried out a magnetometer survey and outlined two concentrations of magnetite. Assays showed a high sulphur ore. No work has been done on the property since 1902.

The area on the west side of St. Peters Channel is underlain by Pennsylvanian sandstones and shales in a band striking northeasterly. Windsor rocks occur southeast of the Pennsylvanian formations in the immediate area of the Channel. Horton rocks lie southeast of the Channel. The Pennsylvanian-Windsor contact is believed to be a fault contact while the Windsor-Horton contact is considered to be normal. A number of younger basic intrusive plugs occur along and adjacent to the Windsor-Horton contact. There may be also a set of northwest striking faults in this area.

A great part of the ore was magnetite, part of it strongly magnetic but it can hardly be called a magnetite as it resembles hematite in many particulars. It is a bedded deposit in limestone. In the magnetite, crystals of pyrite are quite abundant which causes a high content of sulphur. The ore is reported to be 15 feet thick, having a dip of 9 degrees east.

Three shafts were sunk in the area with depth ranging from 27 feet to 82 feet. The most authentic information was obtained from the records of the 82 foot shaft located midway between the other two. This shaft showed iron ore for a short length. The records of the four boreholes along the iron zone are not available, but are reported to have intersected widths of up to 30 feet of iron. Four tunnels were driven from the brook into the hillside.

The following analyses are available from various locations on the iron ore belt:

Values in per cent			
Location	**Iron**	**Phosphorus**	**Sulphur**
Near bottom of new shaft	31.13	0.736	1.032
Old tunnel	49.52	0.658	0.748
New tunnel	56.11	1.800	0.260
Dump of new shaft	32.82	0.492	1.438
No. 3 tunnel	51.12	0.684	0.472

References

Carlsson, G., 1900:
Report on MicMac Mine, Dominion Iron and Steel Company.

Jennison, W. F., 1902:
MicMac iron deposit, Report to Dominion Iron and Steel Company.

Red Island Hematite Deposit (72)

Lat: 45° 48' 20"
Long: 60° 43' 15"
Ref. Map: 11nbsp;F 15 East Half

This deposit is situated on the southeast side of Bras D'Or Lake 2 1/2 miles beyond Irish Cove in Richmond County, and about 30 miles from Sydney. It occurs along the high steep bank of a stream, about 1/8 of a mile from the shore and about 1 1/2 miles northward from Red Islands.

The deposit occurs on the contact between the Upper Windsor Group and rocks of the Fourchu Group of Precambrian age. The hanging wall is a shaly slate and the footwall a diorite.

In a report by Brown in 1912 it is stated that three drifts were driven into the hillside, but ore was found in only one of the drifts. It was 47 inches thick. In one trench 10 feet deep a 2-foot vein of hematite was exposed. It strikes east and has a dip of 80 degrees south. One analysis is available:

Values in per cent	
Iron	61.18
Silica	6.30
Phosphorus	.031
Sulphur	.146

Indications are that the iron ore is fairly high in silica, and occurs in pockets distributed along the contact.

References

Brown, J. F., 1912:
Report to Dominion Iron and Steel Company. (Files of N. S. Dept. of Mines)

Jennison, W. F., 1913:
Report on hematite deposit at Red Islands for Dominion Iron and Steel Company, Sydney.

Lynch's River Iron Deposits (73)

Lat: 45° 39' 51"
Long: 60° 49' 30"
Ref. Map: 11nbsp;F 10 West Half

The deposits are situated in the Lynch's River area, Richmond County, Cape Breton Island, about 2 1/2 miles northeast of the town of St. Peters.

The property was examined in 1911 by John Midgley for the Dominion Iron and Steel Company. His report was unfavourable and no further work has been carried on.

The iron occurrences are in the Horton Group rock overlain by limestone of the Windsor Group. The eastern shaft was 12 feet in depth and shows veinlets of specular hematite for its depth. At the bottom the strike of the iron occurrences is easterly and dips to the north at 35 degrees.

The west shaft was 20 feet in depth and the iron occurrences are similar but at the bottom of the shaft the vein widens to 4 inches and dips steeply to the north. Trenching westward from the shaft indicated minute stringers of specular hematite varying from 2 to 8 inches in width. No analyses are available from any of the showings.

Reference

Midgley, J., 1911:
Report on iron ore deposits at Lynch's River, Richmond County for Dominion Iron and Steel Company, Sydney, Nova Scotia.

West Bay Iron Deposit (74)

Lat: 45° 43' 35"
Long: 61° 01' 30"
Ref. Map: 11nbsp;F 11 East Half

The iron ore deposits are situated at Black River and McInnis Point on the shore of West Bay, Richmond County, Cape Breton Island.

Prospecting was carried on in 1907 to 1908. Lack of funds caused this work to be stopped in the fall of 1908 to there is no record of any further prospecting having been carried out in the area.

The rocks in the locality of the deposits are part of the Fourchu Group of Precambrian age overlain along the shore by limestone of Windsor Group.

About a mile east of McInnis Point, considerable work was carried on adjacent to a brook running north and south. On the east side of the brook near the shore, a 26-foot shaft was sunk which showed slate at the top but farther down a thin seam of high grade iron was intersected. The dump from this shaft showed a mixture of slate and hematite along with pieces of high grade hematite that had been sorted out. Fifty feet upstream and across the brook a 600 lb. sample was taken from a narrow high grade hematite vein. This sample gave the following analysis:

- iron 65.33 per cent,
- silica 3.68 per cent,
- phosphorus .0015 per cent and
- sulphur .001 per cent.

Continuing upstream for about 3/4 of a mile bedded deposits in the slates, varying in width from 15 to 30 feet, and spaced every few hundred yards, are exposed in the bed of the brook. Heavy cave prevented the tracing of these beds on the east side of the brook, but westerly 1/4 of a mile a 22-foot trench was excavated across a bed of iron free from slate. The hanging wall of the deposit was reached but both hematite and ochre was cut in the trench. A 30-foot shaft was sunk on this showing. This exposure is about 3/8 of a mile from the shore.

Near McInnis Point another brook runs into West Bay and exposures in this brook are similar to those on the brook to the east. A 26-foot shaft was put down on a low grade hematite running along Black River. At this point the iron was mixed with gypsum.

Reference

Smith, M., 1908:
Report on iron deposit at West Bay. (In the files of N. S. Dept. of Mines)

Madame Island Iron (75)

Lat: 45° 28' 30"
Long: 61° 00' 00"
Ref. Map: 11nbsp;F 6 East Half

On the south side of Madame Island, and south of village of Arichat, thin veins of specular hematite of no economic importance are found in the Precambrian felsites of Mackeral Cove and Guet Cove.

Narrow veins of specular hematite have been found in several places, in the vicinity of St. Peters, but so far no ore body of sufficient size to warrant working has been exposed.

Reference

Lindeman, E., and Bolton, L. L., 1917:
Iron ore occurrences in Canada, Dept. of Mines, Mines Branch (No. 217) p. 200.

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Conclusions

The known Canadian iron deposits now in production or being developed by large steel and iron ore interests give indication that they will be capable of producing well in excess of 100 million tons per year if necessary. The large Quebec-Labrador deposits are well located with respect to both the American and European markets, and there seems to be little justification, or even room, for the small independent operator in the iron ore picture of the future.

A review of reserves in Canada indicates that there will be no shortage of iron-bearing material for many generations to come, thus making Canada a major power in the iron ore industry. Both the direct-shipping hematite deposits of the Labrador Trough and the low-grade deposits located at the extreme ends of the Trough give promise of developing an enormous production potential.

Figure: (Not presently available)
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